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## POWER AND GAS

**Devoted to the Conversion, Transmission and Distribution of Energy**

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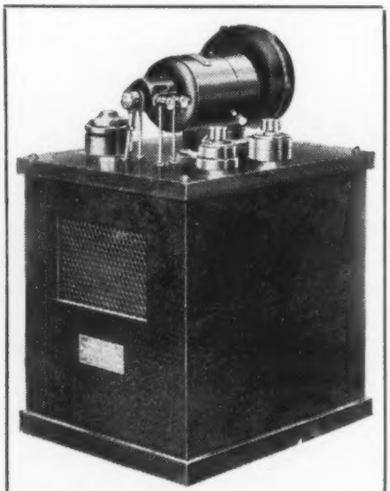

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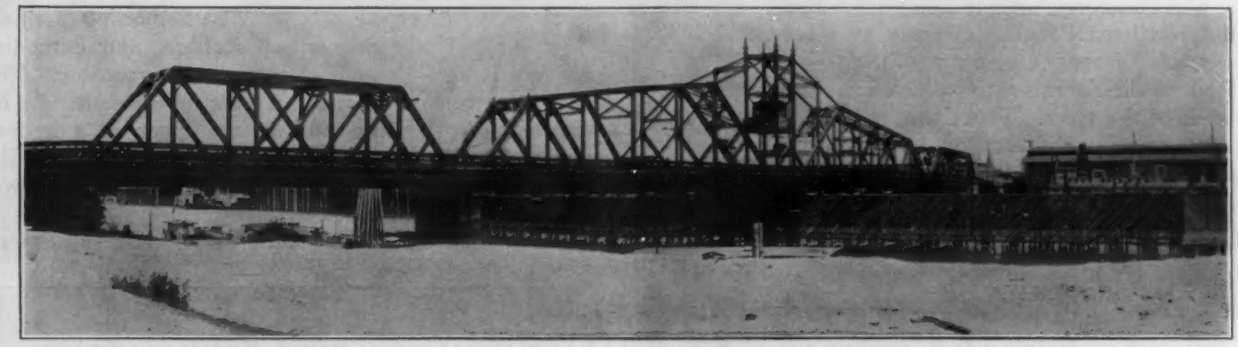


Steel Drawbridge Over the Sacramento River. Steamer "Capital City" on the Right.

# THE SACRAMENTO AND WOODLAND RAILROAD

BY RUDOLPH W. VAN NORDEN.[1]

The electric railway, that inevitable stamp of progress, the evidence which is in itself both a cause and effect and which is now looked upon the world over as the talisman, is slowly but surely weaving its web up and down and across the Sacramento Valley of California.

This valley, perhaps the most fertile, and certainly one of the richest in potential values in America, has suffered for want, not only of cultivation, but of rapid and easy means of communication to make cultivation possible. Not that many parts have not been cultivated to the highest degree, for the bottom lands have been reclaimed and farmed to a high state of perfection for many years and in fact the entire valley is wonderfully productive, but the future possibilities are indeed great.

Already the Northern Electric Railway has shown, in its success physically and financially, what can be expected, and the projected feeder, the Vallejo & Northern and its forerunner which is now an accomplished fact, the Sacramento & Woodland are but threads in the interurban network which is bound to develop rapidly.

The Sacramento & Woodland covers one of the oldest and richest farming sections in the state. Its route through orchards and hop vines and along the cottonwood bordered river is picturesque in the extreme. The new road supplies a crying want for transportation. It is well designed and constructed and should mark a milestone in the forward progress of the section tributary to it.

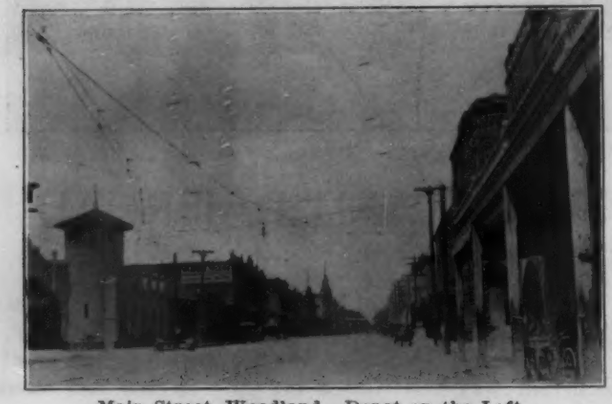
[1]Member A. I. E. E., A. S. C. E.

On July Fourth of this year passenger traffic was formally inaugurated although regular scheduled traffic was not begun until the fifteenth of that month. Current was first turned into the electric rail on the second of July and on that day a car was run over the line and return without interruption or accident, but not without incident. The day that this run was made had been a very strenuous one for those in whom the construction work was in charge. There was, even late in the afternoon, much grading to be done, especially at the approaches of the Sacramento bridge; rails to be laid and heavy connections to be made. From appearances, the actual operation of the line seemed at least several days off. But the formal opening was scheduled two days later and there was much to be done in the intervening time to make traffic safe and sure. The work, however, had been well organized and every man was doing his best and the sun had not yet set over the purple Coast Range hills when the first car was on its way. There had been no public announcement, nobody was supposed to known that the car was coming; people must have sensed it somehow, for every ranch and crossroad had its crowd, everyone was cheering and happy, because this, one of the most fertile and highly cultivated districts in California, a district always handicapped however by an absolute lack of any but transportation by teams over necessarily indifferent roads, which was to be finally relieved by not only receiving transportation facilities, but further by a modern interurban freight and passenger service of the highest order. As the terminal at Woodland was approached

the county road paralleling the railroad was a cloud of dust from the score or more automobiles racing to be the foremost to meet the first car. And when the city itself was reached, the streets with their crowds had the appearance of some street carnival.

### Engineering Data.

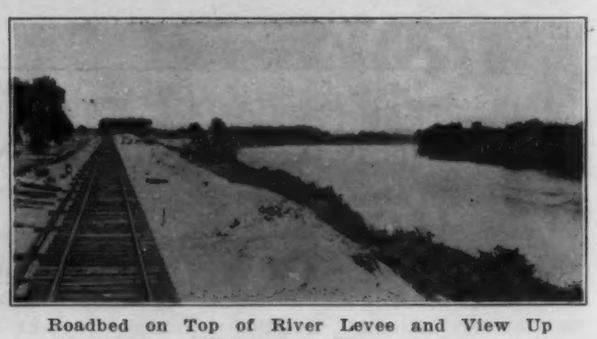
Beginning at the terminus of the Northern Electric Railway's line at the depot of that company, Eighth and J streets in Sacramento, a single track follows Eighth street southward a distance of three blocks to M street, thence West on M street to the Sacramento River. The line continues on a tangent across the steel drawbridge and then follows its own embankment for a mile after which it curves, taking a northwesterly direction, crosses the main line of the Southern Pacific Company at Mikon and follows a series of tangents, more or less close to the west bank of the Sacramento River to Elkhorn, on the levee bank of the river. From this point the line goes due west, crossing the overflow basin of the river on a long pile trestle and finally continuing with ordinary construction for a flat ground surface. It enters the city of Woodland at the east end of its main business street and continues along Main street to the center of the business section, where the depot is situated on one of the most important corners.



Main Street, Woodland. Depot on the Left.

The length of the line from the Sacramento to the Woodland depot is 17.93 miles. The length within Sacramento is one mile. Here a standard paved street construction is used, the trolley is the catenary type, the wire being No. 0000 deep-grooved copper and the track is equipped with 114 and 116 lb. "Trilby" deep girder rails. Just before reaching the bridge over the Sacramento River, there is a spur track which parallels the freight house and river landing of the Sacramento Transportation Company's steamers, also a connection to the tracks of the Southern Pacific Company and in addition a connection with the freight sheds of the Northern Electric Company. The girder type of rail and catenary trolley wire is carried to the bridge on which a standard rail is used with the electric third rail. A semaphore signal at the center of the draw informs an approaching car whether or not the bridge is clear to permit crossing.

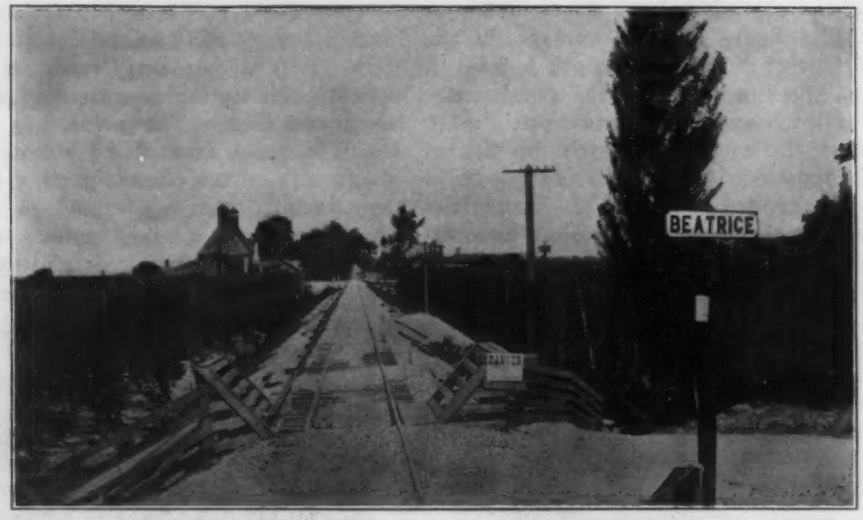
The natural level of Sacramento city is not in altitude greatly in excess of the bed of the river and at times of high water is somewhat below the river level. All of the reclaimed districts adjoining the Sacramento River are protected from overflow by levees or earthen embankments high enough to be well above the highest water record. These levees are about 15 ft., above the surrounding country. In approaching the bridge from either side the levees are crossed and the bridge floor is consequently slightly above the top of the levees. In constructing the railroad following the west bank of the river, it would have been possible for much of the distance to have placed the road on the crest of the levee, or, to have built the roadbed in the ordinary manner, on a right of way, back from the levee on the level land. For various reasons, neither plan was adopted, but a private right of way was secured on the most direct line and an embankment, practically equal in height to the river levee was constructed beginning with the west end of the Sacramento bridge, and extending to the pile trestle which crosses the overflow. This was a costly expedient but a wise investment. As before stated, the line follows the river in a general way. The river is very crooked, so that the line cuts off much unnecessary distance; the levees from year to year suffer much erosion from the flow in times of high water, and while they have a high factor of safety from actual break, such disasters have occurred, they therefore require more or less repair, both of these features giving good reason for keeping the track away from the levee crest. In case of seepage or actual break a low track would be flooded; finally the high roadbed is not only a safety factor towards uninterrupted traffic, but should a levee break, the embankment is amply strong to withstand the flood from the river, thus acting as a second levee without interruption of service and at the same time saving the land and crops of the farmers' whose land is adjacent and from whom the company derives a portion of its revenue.



Roadbed on Top of River Levee and View Up Sacramento River.

The embankment varies in height from 10 ft. tc 20 ft. and is about 50 ft. wide at the base, the top having a width before placing the ballast of 16 ft. This was built largely by contract, the earth being placed with dredgers, or teams and scrapers. There was more or less variation in the cost of this work, but the average cost of placing the earth to the company was 20 cents per cubic yard. There was no rock and the ground is a heavy alluvial soil.

Except on bridges and trestles, a broken stone ballast was laid. This consists of clean crushed boulders from the Natomas crushing plant at Folsom and is the highest grade of rock ballast procurable. This ballast was specified to have a thickness of 8 in. under




Passing Through a Picturesque Hop Ranch. View Shows Various Features of Roadbed and Track Construction.

the ties, or 14 in. in total depth, but actually was placed about 1 in. in excess. The amount of fill in the embankment for the entire road was 1,500,000 cubic yards and the amount of broken rock for ballast is 3000 cubic yards per mile.

Standard split redwood ties, 6 in. x 8 in. x 8 ft. spaced 15 to a rail length were used, every tenth tie having a length of 10 ft. to provide a fastening for the third-rail chair.

The rails are 60 lb. standard A. S. C. E. profile, with continuous rail joints and 400,000 c.m. brazed bonds.

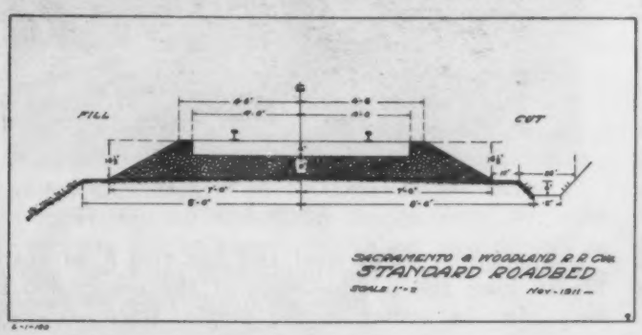
The electric, or third rail is 48 lb., special high carbon steel, having a much lower resistance factor than the running rails and also having a special profile. This rail is mounted on standard Northern Electric chairs, a type designed for and used exclusively by that company. They consist of a malleable iron base and clamp top which engages the rail, the base and top being joined by an impregnated wooden block insulator.

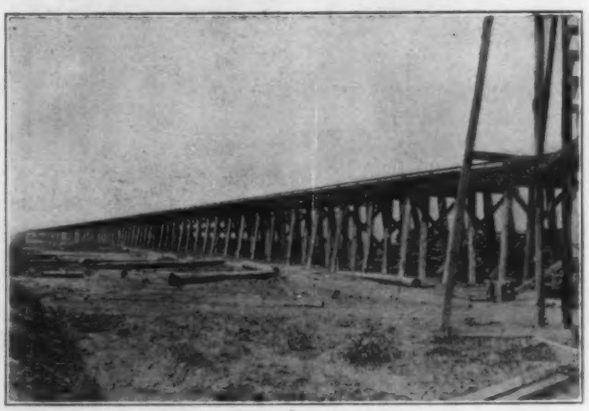
At all road crossings, the third rail is discontinued, the blank ends being terminated with a point to readily pick up the contact shoe on the car truck. Wood cattle fences are provided and Kalamazoo perfect sheet steel cattle guards are used. The right of way is fenced on both sides with a 4 ft. rabbit proof galvanized wire patented fencing.

The electrical continuation of the third rail over crossings is made underneath the crossing by 750,000 c.m. rubber-covered cable laid in iron pipe. This conduit is brought up to a pothead at each end, which stands at about the level of the rail. This pothead is filled with insulating compound and makes the crossing perfectly watertight. The cable from the pothead is soldered directly to the rail.

After leaving the river, the embankment is carried to the "back levee" a distance of about 1½ miles. This protects the reclaimed cultivated land from the overflow of the Sacramento River.

There was a time during the early settlement of the state, and before hydraulic gold mining operations were commenced in canyons of the Sierra Nevada mountains, on rivers tributary to the Sacramento, when the channel of that river was of sufficient depth to carry its flow between its banks, and there were no levees then. The debris from the mines gradually filled the bed of the river flooding the adjoining country. This prompted the building of levees and the creation of Reclamation Districts. The low lands down the center of the valley probably always carried some overflow water, but when the river became filled with mining debris, it became necessary for the safety of levees below, to relieve flood water in the river by discharging into the Yolo basin, commonly called the "overflow." It was therefore necessary in building the railroad across this basin to provide a pile trestle which would not obstruct this flow, notwithstanding that six or more months in the year the ground under the trestle is dry.



Trestle Crossing the "Overflow."

This trestle follows Northern Electric standards, has eight pile bents and an average height above ground surface of 20 ft. The length is 8000 ft. The remainder of the line is above the flood water level and ordinary ditch and fill construction is used.

Beginning with the eastern limits of the city of Woodland, use of the electric rail is discontinued and a catenary trolley suspended from steel poles on either side of the street for a distance of one mile. The catenary support is Northern Electric Railway type and the trolley is No. 0000 grooved copper.

Depot at Woodland Showing Train Ready to Pull Out.

There have been constructed side tracks and spurs wherever necessary for traffic, the total mileage being as follows:

| | | |
|---|---|---|
| Main Line ..... | | 17.93 miles |
| West Sacramento ..... | 300 ft. | |
| Mikon ..... | 950 ft. | |
| Rose Orchard ..... | 650 ft. | |
| Lovdal ..... | 600 ft. | |
| Leeman ..... | 400 ft. | |
| Marty ..... | 550 ft. | |
| Beatrice ..... | 500 ft. | |
| Vin ..... | 400 ft. | |
| Hebron ..... | 350 ft. | |
| | 4700 ft. | |
| or | 0.89 miles | .89 |
| Total Mileage, e.s.t.... | | 18.82 miles |

## Depots.

As before stated, the Northern Electric station is used as the Sacramento terminal. There are at present 9 line stations, each equipped with a plaform and there will be eventually, a number of shelter stations at these points. The only depot at present is at Woodland and this is one of the most elaborate and carefully worked out interurban depots on the Pacific Coast. It is situated on the corner of Main and Second streets in the center of the business section. It is an imposing structure in a modified Spanish Mission style of architecture, of cement stucco on expanded metal.

The track from Main street enters the building diagonally on the corner, passing through to the storage yard in the rear. On one side are arranged the baggage and express rooms and on the Main street side are the waiting rooms, ticket office and lavatories, the entire arrangement being very complete.

Waiting Room, Woodland Depot.

The main waiting room has a large fire-place in one side and is finished in natural wood. It opens on to a deep arcade which parallels the street and is open thereto.

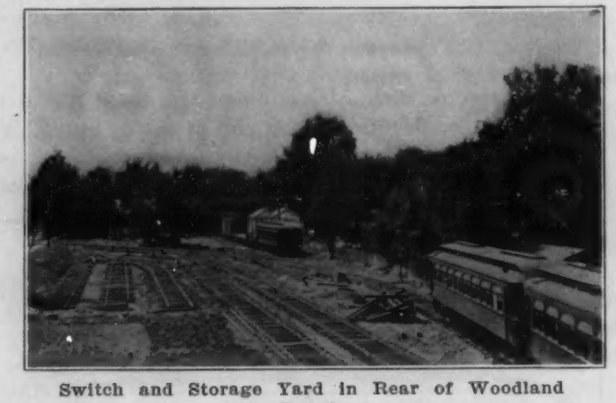
In the rear of the depot is a storage yard 418 by 113 ft. and containing 6 tracks, giving storage for 30 cars.

There is a Y consisting of a spur track laid north of Main street along Second street, to permit the turning around of cars or trains.

## Sacramento River Drawbridge.

The only spectacular or unusual engineering work in connection with the Sacramento & Woodland Railroad is the bridge over the Sacramento River and this might not appear so except to one who was familiar with the preliminary work in building the structure.

Mission Arcade Entrance to Waiting Room, Woodland Depot.



Switch and Storage Yard in Rear of Woodland Depot.

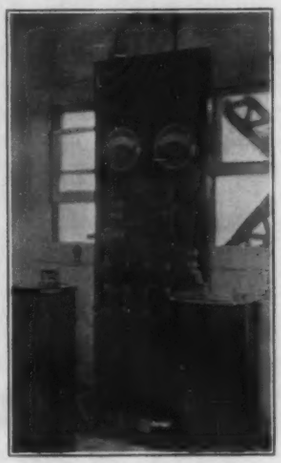
The bridge is of steel and has two fixed spans 125 ft. long and a draw span at the center 400 ft. long. In the center is the single track railway,

having a clearance of 16 ft., on either side of which are roadways each with clearance of 11 ft. and outside of the roadways are sidewalks 4 ft. 6 in. wide. The loading for the railway portion is Cooper's E-40.

There are five concrete piers, two of which are built into the levees on either side of the river, three are in the river, the center one carrying the draw span.

There is no bed rock at this point within several hundred feet of the surface and the ground is sedimentary, being made up of silt from the mines and gravel with more or less clay. This material gives a good foundation provided it has sufficient depth to prevent erosion from the flow at the river.

View of Bridge Floor; Operator's Cabin; the Dome of the State Capitol in the Distance.



Switchboard and Controllers in Operator's Cabin.

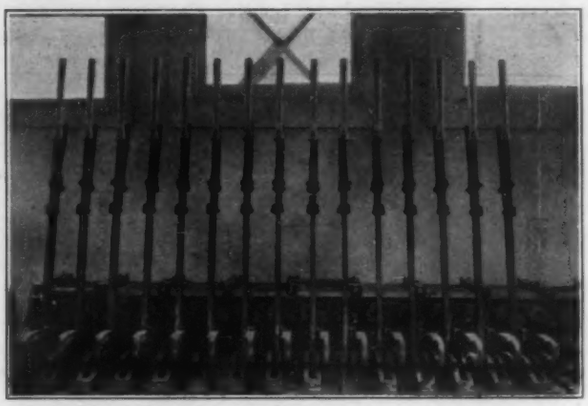
The concrete piers, which are about 100 ft. high and extend below the bed of the river a distance of 60 ft., were placed in excavations made with caissons which were lowered as the excavation progressed. These caissons were constructed of heavy timber and were air tight, the bottom edge being fitted with a wrought iron shoe. In operating they act as if they were giant diving bells gradually sinking. Compressed air under a pressure of 45 lb. to the square inch was supplied within the caisson, this pressure of air being greater than the pressure caused by the surrounding water, served to prevent water and sand from running back into the excavation, meanwhile the material to be excavated was carried by a 6 in. pipe through the caisson and discharged on a barge. As the excavation deepened the caisson automatically followed until sufficient depth was reached. Throughout this work a man stationed at the discharge pipe to prevent boulders larger than a certain size from going through the pipe, practically handled all of the dirt excavated, so it is jokingly said that the pier excavations, 60 ft. below the river bed were dug by hand.

Concrete for the piers was placed by reversing the digging action, the concrete at the surface being confined within sheet piling.

Extending up and down stream from the center pier are pile bulkheads, which act as a protection to the pier from debris, but which were built as a support to erect the draw span.

The upper part of the center pier is cup shaped, i.e. there is a pit 10 ft. deep within it, within which is placed the turning gear, the sides or wall of this pit being a protection from high water in the river. The superstructure is balanced on a roller turn-table whose circular track is placed on the bottom of the pier pit. Outside of this track and within the pit wall is a stationary horizontal gear rack and the movement of the bridge is actuated from this rack.

Over the turntable and directly under the bridge floor are mounted two direct current 60 h.p., 500 volt, d.c. motors. Each is back-geared to a vertical counter shaft through beveled gears. This counter shaft is in turn geared through spur-gears to a second vertical counter shaft, on which is mounted a brake-wheel, and finally this second countershaft is again geared to a third vertical counter shaft, the pinion



Levers for Operating Signals and Gates.

at its lower end engaging with the stationary gear rack. This gives four speed reductions from the motor.

The ends of the draw, when closed, are supported on heavy cast iron plates bolted to the top of the piers. In order that the weight of the draw at the extremities may bear on the respective piers, after the draw is closed, there were provided heavy jack screws. These pass vertically through a huge nut bolted to the bridge structure and drive wedge shaped blocks into depressions in the cast iron pier-plate thus giving the draw a rigid bearing on the pier. These jacks are each driven by a 15 h.p., 500 volt direct current motor, which at the same time moves bolt-rails between the end of the draw and the stationary spans to give a continuous track.

The operating cabin is mounted over the center pier, well above the track. It is 12 ft. square and is built of reinforced concrete, having 4 in. walls. It is reached by iron stairs. In this is a black slate switchboard containing two main switches, one for the bridge motors and the other for the jack motors. These switches have an interlocking device, so that when one is closed, the other must be open and vice versa. Overload circuit breakers and five switches on lighting circuits as well as a jack testing switch are included. In front of the switchboard are placed two railway type controllers used in operating the two groups of motors.

Ranged along another side of the cabin are 15 signal levers, with spaces for 5 more. These operate in-

terlocking semaphores, at railroad crossings on the Sacramento side entrance to the bridge, etc., and operate the gates on the draw and at the ends of the stationary spans.

Power for operating the bridge is supplied through a submarine cable from the Sacramento side, which also supplies current for the road beyond the bridge. This cable built by the Safety Insulated Wire & Cable Company is a single conductor of 1,500,000 circular mils in a strand of 91 wires. The conductor is covered with a 30 per cent Para rubber insulation 9-64 in. thick, which in turn is taped and covered with a 9-64 in. lead sheath. The sheath was then served with jute and armored with one layer of No. 8 and then one layer of No. 4 galvanized steel wire outside of which is placed a jute and sand finish. The cable was laid in two lengths of 650 ft. each, with the aid of a barge, the bridge erecting apparatus and a reel rack with a special chain bridle, the reel being supported on a 4 in. shaft spindle. There are two switch

View Entering the City of Woodland.

boxes on the center pier and one each on the span rest piers, thus dividing the cable in four parts, enabling the cutting out of a section in the case of disablement without interrupting traffic. Taps are taken from the switch boxes on the center pier for operating the turning and jack motors and also for operating a centrifugal pump to be used in case of fire, having a capacity of 600 gal. per minute under pressure of 100 lb. per sq. in. There is also a ten-pair armored telephone cable laid. A loop in this cable is brought up the center pier to a junction box. This is necessary for purposes of testing and for a connection to a telephone in the bridge-tender's cabin.

### Train Service and Operation.

This road is now operated as a continuation of the Northern Electric system, and through trains over that system after arriving at Sacramento continue to Woodland. This is found to be a very convenient arrangement both for the railroad and the public. An additional local service between Sacramento and Woodland is provided between the running of the through trains. There are now operated 11 trains each way, of which 8 each way are through.

Dispatching trains is done by telephone, there being a dispatcher stationed at Sacramento and an operator at Woodland. There are a number of telephone stations along the line where conductors may ring in for orders and there are telephones at the two substations. There are two telephone lines, one being purely for dispatching while the other is for general railway business.

The running time for passenger trains over the road is 35 minutes which allows an average elapsed speed of about 30 miles per hour. This time can be shortened by several minutes and it is the intention to do so after the roadbed has become settled.

### Rolling Stock.

Cars of the Northern Electric Company being used except for local trains between Sacramento and Woodland, there is a little necessity for car equipment. There is, however, beside construction cars, one combination passenger coach. This car was built in the Northern Electric shops at Chico, Cal., and is modern and of the highest grade of workmanship and conforms to the newest standards of that company. The car is a combination, baggage, smoker and coach, finished inside with inlaid mahogany with veneered ceiling. The seats are plush and leather upholstered and the windows large, giving a full sense of comfort. Enclosed incandescents are used for lighting with tungsten side lights. The exterior is finished in Northern Electric orange and given a high finish. The trucks are equipped with four Westinghouse 121 A., 90 h.p. motors. Westinghouse pneumatic multiple-unit control is installed and Westinghouse automatic air brakes complete the car equipment. The Northern Electric radical draft gear is also used.

This car makes the local round trip between the runs of the through Northern Electric trains.

### Substations.

There are two substations, belonging exclusively to this system, one at Woodland and the other, at present a portable, located at Elkhorn.

The Woodland substation is now under process of construction and for the present a temporary structure is used. The permanent station will be a reinforced concrete one-story building, 40 by 60 ft., on the company's property at the eastern limit of the city. It will contain three 250 kw. transformers which receive 3-phase current from the local lines of the Pacific Gas & Electric Company at 11,000 volts and will supply the motors of two motor generators at 2200 volts. These transformers are water-cooled and will be placed in concrete cells. In the main room will be the two motor-generators, the generators being 800 kw. delivering current to the railroad at 600 volts and driven at 514 r.p.m. by two 580 h.p. induction motors. The usual switchboard equipment is provided. The feeders are brought from the substation, underground in two wrought iron conduits which terminate in potheads at the side of the electric rail.

Current from Woodland is carried on a pole line to Elkhorn to feed the portable substation. This was built by the Northern Electric Company at its Chico shops. It is a standard 40 ft. flat car of 80,000 lb. capacity, on which has been erected the station superstructure and within which are mounted the motor generator and a switchboard.

Power for the Sacramento end is supplied from the substation of the Pacific Gas & Electric Company and is the same source of supply as for the Northern Electric Railway.

## MONTANA ECONOMICS IN USING CONVICTS FOR ROAD WORK.

An interesting paper was recently presented before the Montana Good Roads Congress meeting at Anaconda by Albert J. Galen, attorney general of Montana. Due to union conflicts the care of prisoners has always been a great burden to this state. The newly devised trusty system, wherein the labor of convicts is used to construct good roads and incidentally give life and hope of parole to the convict has thus far met with unquestioned success for all concerned. An abstract of Mr. Galen's paper is as follows:

It is not the intention or desire of the state board of prison commissioners to interfere with free labor, and I feel that when the various labor organizations learn and understand the character of work undertaken that it will not be in any way considered objectionable. Impartial investigation will convince any fair-minded man of the merits of the present system and the lasting benefits to all classes of citizens. All of the work undertaken and which is now being prosecuted is of general public benefit, and is of such a character that it would not, and could not, be done during the lifetime of any of us, unless by the use of prison labor. Neither the state nor the various counties are possessed of sufficient funds to construct difficult and expensive roads, which in most instances are an immediate necessity. Let us all join in the advocacy of state aid with the use of prison labor in the construction of good substantial roads, and when such roads are completed, let them be turned over to the counties in which they are located, and thereafter maintained and improved by such counties. The maintenance and improvement of such roads after they are built can be readily provided from the ordinary levy of taxes for the road fund in each county. Such highways of travel and commerce tend to upbuild any community; they will attract immigration and settlement more than any other improvement, and without them it is impossible for any community to advance and prosper. They are of benefit to all classes, and more particularly the working man and his family. Good roads add greatly to the industrial activity of any community; they attract investment of capital, and as a result the laboring classes are benefited in larger numbers than others. The laboring classes travel our public highways in greater numbers than others, and where our roads are well constructed the laboring class is thus the greatest beneficiary.

In Montana we have an abundance of good road making material, but generally the first cost of road construction is expensive, because of the topography of the county. The use of prisoners in the construction of public roads in this state has already proven itself a success beyond our most sanguine expectations; and the resulting benefit to the prisoner, physically and mentally, from a humanitarian standpoint, is a sufficient justification for the work undertaken.

The Good Roads Congress held in Billings two years ago and at Missoula last year have done much to give an impetus to good road construction, and this Anaconda meeting is sure to have its beneficial and lasting results. Those of you who have lived in Montana for a number of years realize and appreciate how difficult and expensive it has been in the past to travel our roads, and particularly when hauling freight of any character over the same. We have all witnessed year after year the expense and discomfort incident to bad roads, but until recently there has been no concentrated effort for improvement. I have known of roads in Montana where men with loaded wagons were mired year after year, and on each occasions were only able to extricate their teams and wagons at considerable expense, trouble and loss of time. Yet, notwithstanding such experiences, no effort was made to improve the highways. Each man waited for his neighbor to act, and all waited for the county to make the needed repairs and improvements; but the counties failed and refused to act, because of the lack of funds. With prison labor and at a moderate expenditure, such conditions can be easily remedied; and it is unnecessary to further explain to you the immediate and lasting benefit of any such improvement.

In dealing with the counties under our present method, and in furnishing state aid with the use of prison labor in public road construction, we require each county to enter into a contract similar in terms to the following, which is an extract taken from an agreement recently entered into with Park county for certain road construction in that county:

"In consideration of the mutual benefit and advantages, the county of Park has undertaken and agreed, and does hereby undertake and agree, that it will furnish unto the state of Montana, for use of its prisoners in road construction within said county of Park, all necessary powder, drills, picks, shovels, scrapers, wagons, horses and harness necessary and desirable to be used in proper road construction, including the cost of transportation to and from the place of employment, over and above the sum of fifty (50) cents per capita per day. It being distinctly understood that the state of Montana is to furnish the prison crew at the rate of fifty (50) cents per capita per day, and no greater amount; this representing the cost of maintenance of said crew of prisoners under the terms of this agreement, shall begin at the time the prisoners are moved en route to the place to which they are to be employed, and shall thereafter include the cost incident to the return of prisoners to the state prison at Deer Lodge, Montana, for violation of rules and regulations, and the transportation of other prisoners to take their place."

As before stated, the trusty system of working prisoners in Montana was commenced on April 27, 1910. Since that time the percentage of successful escapes by prisoners has been less than one per cent. The prisoners are placed upon their honor, and generally work willingly and hard. To see them at work in road building one would think they were each being paid $5.00 per day and were afraid of losing the job. In truth and in fact, they are fearful of losing the job. They enjoy this trusty system, and dislike opposition to its continuance; whether emanating from fellow prisoners or other persons. Disobedience to rules on the part of prisoners or escapes, of course, tend to discourage the system; as does also

the failure of juries to punish those who are charged and prosecuted for making escapes. Any prisoner thus trusted who violates any of the regulations, or attempts to escape, is looked upon by his trusted associates with scorn; and the prisoners themselves constitute guards over their fellow prisoners engaged in this work, and most captures of attempted escapes are made by fellow prisoners. The trusty prisoner under our system is allowed ten days per month off of his time in addition to the good time allowance made by law for good conduct and obedience to rules. Now to better illustrate the incentive of the prisoner to be good, let us assume that a man has a term of five years' imprisonment; for good conduct and obedience to the rules and regulations, the law would allow him on such term a deduction of one year and three months, and if he worked constantly upon the roads he would be allowed a further reduction of 120 days in addition for each year of imprisonment. Under the law, if he were entitled to good time because of obedience to the rules and regulations he would only have to serve three years and nine months; and if he were also to work every month on the outside, this term of three years and nine months would be reduced 450 days, so that he would have in fact only to serve on a five-year sentence two years, six months and five days. So, you see, the incentive is great for a prisoner to be good and diligent in his work.

Now let us see what results have been accomplished in this state to date, and the financial advantage thereof. The system was instituted shortly after the prison was taken over from the former contractors, Conley & McTague, although I had advocated it long before. Necessity was aidful in making it a reality, for, on taking the prison over from the contractors, it was found that the state had two hundred more prisoners than cell room. Therefore the surplus number of prisoners had been cared for on the ranch property of the contractors; but when the state took over the management it was confronted with a serious problem. Time would be consumed in the construction of additional buildings, and there was no place to house the extra number of men until the required buildings could be erected; the state was without funds with which to make the needed improvements; and thus, you see, exigency forced our board to take this action, which I believe to have been the wisest act during the administration of Governor Edwin L. Norris. I know that the work will be continued by our successors in office, and that it will always reflect credit upon those by whom it was initiated; and as well, upon those responsible for its continuance. Personally, I shall ever feel proud of the part I have taken in making the trusty system a reality, and I have no apology to make to anyone therefor.

The following statement of mileage of work done in road construction and the cost thereof will be found interesting and instructive:

In Powell County our prisoners have made twenty-four miles of good road at least twenty feet in width, with gravel top and drain ditches on either side; and in this stretch of road they constructed nine cement bridges across various streams; one of which bridges is thirty-six feet in length and eight of them are eighteen feet in length. In addition, on this piece of road, thirty-one cement culverts were moulded and put in place by the prisoners. This work was done at minimum expense, because of the proximity of the road to the prison; and the fact that Warden Conley and his partner, Col. Tom McTague, furnished teams free of charge. The total cost of the construction of all this work to the county of Powell was the sum of $1,336.64. This figure represents the cost of cement, lumber and other material required and furnished; there being no expense to the county other than for materials.

In Granite County, down in the Hell Gate Canyon, seven miles of road was built, two miles of which was rock work. We have no surveyor's figures respecting the yardage on this work, but the rock work was difficult and considerable.

By virtue of this road construction, the distance between Garrison and Missoula was shortened forty miles, and the traveler given facilities for making the trip on a much better and easier grade than heretofore. Prior to the opening up of this road, it was necessary to leave the Hell Gate Canyon and go around by way of Ovando, in order to reach Missoula. This work was done near Bearmouth and Nimrod, and the total cost thereof to the county was the sum of $2,124.75.

In Missoula County four miles of road was built between January and April 1911. There was 8544 yards of rock work and 14,240 yards of earth work done by the prisoners in this road construction, which cost the county the total sum of $1280.31. If this work was done by contract, calculating upon a very conservative basis, the cost thereof would be approximately as follows:

| | |
|---|---|
| 8,544 yds. of rock work @ $1.00 per yard | $ 8,544.00 |
| 14,240 yds. of earth work @ 30 cents per yard | 4,272.00 |
| Total | $12,816.00 |

The cost of yardage with prison labor was as follows:

| | |
|---|---|
| 8,544 yds. of rock work @ 9.63 cents, or | $ 823.06 |
| 14,240 yds. of earth work @ 3.21 cents, or | 457.25 |
| Total | $1,280.31 |

making a total saving to Missoula County for this construction work by the use of prisoners of $11,-535.69.

In Sanders County the prisoners constructed thirteen miles of road between May, 1911, and May, 1912, and shortened the distance in travel between Ravalli and Paradise sixty miles. In the execution of this work they moved 160,000 yards of rock and 38,000 yards of earth. The total cost to Sanders County for this work was the sum of $8798.09. If this work were performed by free labor under the contract system, conservatively estimating rock work at one dollar per yard and earth work at thirty cents per yard, it would figure as follows:

| | |
|---|---|
| 160,000 yds. of rock work @ $1.00 per yard | $160,000.00 |
| 38,000 yds. of earth work @ 30 cents per yard | 11,400.00 |
| Total | $171,400.00 |

The actual cost with the use of prison labor was as follows:

| | |
|---|---|
| 160,000 yds. of rock work @ 5 9-100 cents per yard | $8,152.65 |
| 38,000 yds. of earth work @ 1 7-10 cents per yard | 645.44 |
| Total | $8,798.09 |

Thus, saving with the use of prison labor on the rock work amounted to 94.91 cents per yard, or a total of $151,847.35, and on the earth work 28.3 cents per yard, or a total of $10,754.56; thus making an aggregate saving to the county of $162,601.91. Theretofore this territory was impassable, and, as stated, by this road the distance between Ravalli and Paradise was shortened sixty miles. Before its construction the traveler was compelled to leave a straight course and go out of his way around by Camas Prairie. The prisoners have been at work in road construction since about the middle of May on the east side of Flathead Lake in Flathead County, but as yet have not received a statement of their work, nor figures regarding the cost thereof.

Park County, as heretofore stated, has entered into a contract with the state board of prison commissioners for a crew of prisoners to be used in road construction, but the prisoners have not, as yet, started work in that county.

For a time a crew of prisoners was employed in Lewis and Clark county, making an approach to the state fair grounds, but I have not obtained figures with respect to the amount of work done and the cost thereof. This work consisted of cutting brush and filling in low swampy ground, graveling the top of the road and fixing an area at the entrance to the fair grounds to be used as an automobile and carriage stand.

In all this road work, please consider that the labor was performed with crude and inferior machinery. We have had very little modern road building equipment, as we have not had the requisite available funds.

## THE PACIFIC HIGHWAY.

The full length of the Pacific highway, as its founders plan it, will stretch from the British Columbia boundary on the north to Mexico City on the south.

The third annual congress of the Pacific Highway Association recently passed resolutions inviting the Mexican Government to extend the highway from San Diego southward to the Mexican capital. Other resolutions were:

That the Legislatures of Washington and Oregon appropriate adequate sums for constructing the portion of the highway passing through their territory. California has $18,000,000 set aside for good roads.

That the Federal Government bridge the Colorado River at Yuma and the Columbia River at Portland.

That all Federal parks be thrown open to automobiles.

That $6000 a year be appropriated from the revenues of the association for (1) patrolling the route of the highway and (2) the salary of an executive officer at $3000 a year.

## ROAD MILEAGE.

Under a report given out by Logan Waller Page, director of the office of public roads, United States Department of Agriculture, 1911, there was in the United States at the close of 1909 a mileage of improved roads amounting to 2,199,387, or an increase of about 47,000 miles in four years.

## SPECIFICATIONS FOR A SANITARY DRINKING CUP.

From the canal zone have come many new ideas on sanitary evolution. The Canal Record of recent date describes a sanitary drinking cup which is easily made from ordinary sheet paper in a few seconds.

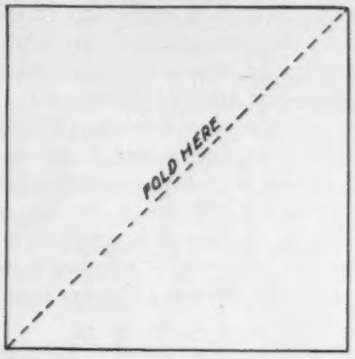



Fig. 1.

To begin with, the paper should be square. If not so, turn over an edge or tear off a strip to make it square. As shown in Fig. 1, fold into a triangle, with edges even. Having once folded, at any stage, do not unfold.

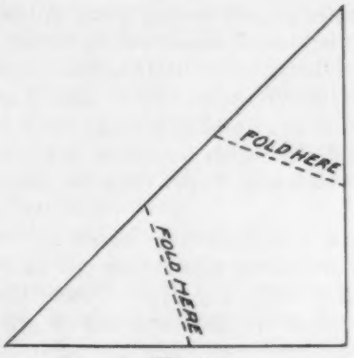



Fig. 2.

As shown in Fig. 2, lay over each of the points at the acute angles of the triangle until it rests near the middle of the opposite edge. The result of this

Fig. 3.

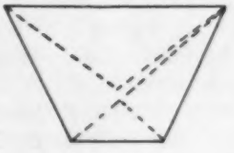


Fig. 4.

folding is outlined in Fig. 3. Fold down the flaps at the top, one on either side, as in Fig. 4, and the cup is completed.

## KELVIN MEMORIAL.

The Institution of Civil Engineers of Great Britain has proposed that the engineering profession erect a memorial window in Westminster Abbey to the memory of the late Lord Kelvin, the distinguished engineer and man of science.

## THE FACTOR OF SAFETY.

### As Called for by the United States Tables of Steam Pressure on Steam Boilers.

REVISED BY J. B. WARNER.

We often see in mechanical papers, and hear engineers and boilermakers remark, that the factor of safety always allowed is 6, and many of them fully believe such to be the case, probably without ever having fully understood the relative proportion between the strength of the joint and solid plate.

The law, adopted in January, 1896, by the U. S. Board of Supervising Inspectors, requires boiler manufacturers to submit a tracing or drawing with the affidavit of material, etc., showing the size and pitch of the rivet-holes in the riveted longitudinal seams or joints, so that the strength or efficiency may be taken into consideration in allowing the working-pressure on all marine boilers.

The rule given below, and Table of Pressures, which has been in use for many years, was adopted before boilers of large diameters and double-welt butt-strap joints of high efficiency came into general use, and applies to single and double-riveted joints only.

#### Rule.

Multiply one-sixth (1/6) of the lowest tensile strength found stamped on any plate in the cylindrical shell by the thickness—expressed in inches or parts of of an inch—of the thinnest plate in the same cylindrical shell, and divide by the radius or half diameter—also expressed in inches—and the result will be the pressure allowable per square inch of surface for single riveting, to which add 20 per cent for double riveting, etc.

The above rule and U. S. Table of Pressures are based upon, and they assume, in all cases, that the boiler manufacturer so proportions the shearing strength of the rivets and tensile strength of the net section of the plate, that when the joint is riveted up it shall be 58.333 per cent for single riveting and 70 per cent for double riveting of the strength of the solid plate.

How many joints do we find in service having the above efficiency? Very few. Therefore it becomes necessary, in order to determine the safe working pressure and the factor of safety upon a boiler, to know the actual, instead of the assumed, strength of the seam or joint, taking into consideration the thickness and tensile strength of the plate, together with the diameter, pitch, and shearing resistance of the rivets.

By results shown by tests, average iron rivets will shear at 38,000 pounds in single shear, and 66,500 in double shear, per square inch of section; steel rivets, 44,000 pounds in single shear, and 77,000 in double shear. By applying the following rule we get the actual, instead of an assumed result, and will further say that, by a series of actual tests, the result shown was within two-tenths of one per cent of the calculations made previous to the tests, and the joints parted in each case at the point calculated.

#### Rules for Riveted Joints.

First: Multiply the thickness of the plate by the pitch of the rivets and by the tensile strength of the plate. Result is equal to strength of solid plate.

Second: From the pitch of the rivets subtract the diameter of the rivet hole, then multiply by the thickness of the plate and that result by the tensile strength of the plate. Result is equal to the strength of the net section.

Third: Multiply the shearing resistance of the rivets (whether in single or double shear), as follows: If iron rivets in single shear allow 38,000 pounds per square inch of section, as the shearing resistance. Steel rivets in single shear 44,000 pounds per square inch of section. If resistance in double shear add 75 per cent to the above.

Fourth: Divide the strength of the weakest section by the strength of the solid plate (first result obtained). Result is equal to the percentage of the joint to the strength of the solid plate.

Fifth: Multiply the thickness of the plate by the tensile strength of the plate and divide by the radius (one-half of the diameter). Result is equal to the bursting pressure of the solid plate.

Sixth. Multiply the bursting pressure of the solid plate by the efficiency or percentage of the joint. Result is equal to bursting pressure of seam.

Seventh: Divide the bursting pressure of the seam by the following safety factors: 0 to 125 pounds, 4.2; from 125 to 150 pounds, 4.5; 150 pounds or over, 5 Result is equal to safe working pressure on the seam or riveted joint.

The U. S. Tables are based upon a factor of safety of 3.5 for drilled holes, and 4.20 for punched holes, which are the lowest factors allowed in any civilized country. The factor in most European countries is either 5 or 6.

We often see joints so poorly proportioned that the efficiency is much below that upon which the Table of Pressures is based.

In many cases double-riveted joints are so poorly proportioned that they have an efficiency of only 41 to 53 per cent instead of 70 per cent. In such cases if the pressures allowed by the table were carried in the boilers the factor for safety would be very much reduced.

For example: Suppose we have a boiler 60 inches in diameter, made of ⅜-inch plate, 60,000 pounds tensile strength, and the efficiency of the joint was only 41 per cent, and 150 pounds of steam was carried, the factor of safety would be $.375 \times 60{,}000 \div 30 = 750$ pounds bursting pressure of the solid plate, and $750 \times .41 \div 150 = 2.05$ as the factor of safety; or, in other words, the seam would burst at just about double the steam pressure (150 pounds). If the efficiency of the joint had been 70 per cent, then $.375 \times 60{,}000 \div 30 = 750$ and $750 \times .70 \div 150 = 3.5$ as the safety factor, which is allowed under the U. S. Tables for Drilled Holes, and entirely too low a factor for safety.

It is very important, in order to get the ultimate safe working pressure, that the joints should be properly proportioned. Under the old system, a joint with an efficiency of 45 or 55 per cent was allowed the same pressure as a 70 per cent joint. This reduced the factor of safety entirely too low. On the other hand, if a boiler was made with butt-straps, and a higher efficiency than 70 per cent was obtained, no allowance was made for the increased strength, although it may

have cost considerable more. No additional pressure over a simple double-riveted lap-joint was allowed.

The efficiency of riveted joints, if properly proportioned, are:

| | | |
|---|---|---|
| Single-riveted joint | about | 56 per cent |
| Double-riveted joint | " | 70 " |
| Triple-riveted joint | " | 75 " |
| Double-weld butt joint. (With four rows of rivets.) | " | 80 " |
| Double-weld butt joint. (With six rows of rivets.) | " | 87 " |
| Double-weld butt joint. (With eight rows of rivets.) | " | 94 " |

There are many styles of joints, and the strength of each can be determined only by careful calculation.

In most cases, especially on old work, it will be found that the net section (between the holes) is much weaker than the shearing resistance of the rivet or rivets, and, in many cases, a double-riveted joint will be found that does not figure as high as a properly-proportioned single-riveted one would have done.

Applying the rule—Example: Suppose we have a boiler 60 inches in diameter, made of 5/16-inch steel, 60,000 tensile strength, double-riveted with ¾-inch rivets, driven in 13/16-inch drilled holes, pitched 2¼-inch. 2:25×0.3125×60,000=42,187 pounds strength of solid plate: ((2,25—0.8125)×0.3125×60,000=26,953 pounds strength of net section; 0.5185×2×38,000=39,406 pounds shearing resistance of two rivets in single shear.

The net section of the plate is the weakest; therefore, 26,953÷42,187=63.8 per cent efficiency of the joint; 0.3125×60,000÷30=625 pounds, solid plate will burst at; 625×63.8 per cent=398 pounds, the seam would burst at; 398÷3.5=113 pounds, as the safe working pressure under the old rule.

If the same had been .70 per cent, then 625×70÷3:5=125 pounds safe pressure under same rule.

It is much more essential that the seams are properly proportioned than if the tensile strength of the material should fall a few pounds under the required strength as called for in a specification; but, in order to get the ultimate safe pressure, good material and workmanship are necessary.

In the General Rules and Regulations prescribed by the Board of Supervising Inspectors of Steam Vessels, as amended January, 1912, Form 801, we find on pages 116 to 118 tables of proportions for riveted joints for steam boilers equivalent to those of the British Board of Trade.

These tables are a great improvement over the old method of riveting seams in haphazard manner formerly followed in many boiler shops.

It will be found, however, that if these tables are analyzed, the shearing resistance of the rivets at the pitch (centers) given varies greatly, ranging from 32,686 pounds to 44,500 pounds per square inch of section in the various types of joints given. It is therefore advisable, in order to get properly proportioned joints, that the actual shearing resistance of the rivets be taken into account, or a mean average of the shearing resistance of the iron or steel rivets used be taken into consideration and the joint proportioned accordingly.

## PROPOSED CLEARANCES FOR CONSTRUCTION OF CALIFORNIA PUBLIC UTILITIES.

Much discussion has appeared in the columns of the Journal relative to overhead construction of power lines and various crossings of one public utility with another. On August 14, the California Railroad Commission called together represeentatives from all telephone, telegraph, railway and power companies in California to consider the matter informally. As a preliminary form the commission issued the following proposed ruling. After considerable discussion, however, it was decided to call for written suggestions as to amendments from all interested and another hearing to take place in ten days from date. The commission is acting in this matter under authority of Section 42 on Safety Devices of the recent California Public Utilities Act. The chairman of the commission, Hon. Jno. M. Eshleman, was careful to state at the preliminary hearing that the proposed order would in no sense be retroactive except as in such cases danger to public safety was eminent.

### Clearances.

1. Railroads, street railroads and streets and public highways, crossing over railroads, and street railroads, which transport or propose to transport standard freight cars, shall provide a minimum overhead clearance above rails of 22 ft., and a minimum side clearance of 10 ft., measured at right angles to the center line of the track; over the rails of street railroads which do not transport or propose to transport standard freight cars, a minimum overhead clearance of 16 ft. shall be provided with minimum side clearance as before mentioned.

2. Railroads, and street railroads, crossing over street and public highways shall provide a minimum overhead clearance of 14 ft. over the surface of such streets and public highways and a minimum side clearance of 24 ft.; except in cases where such streets or highways carry street railroads which do not transport standard freight cars when such overhead clearance shall not be less thon 16 ft. When such streets or public highways carry street railroads which transport standard freight cars the minimum overhead clearance shall be 22 ft. with clearance as before mentioned.

3. Telegraph and telephone lines shall provide a minimum clearance above the rails of railroads, and street railroads, of 30 ft.; above streets and public highways 25 ft.; above or below other telegraph and telephone lines 2 ft.; above electric trolley lines 5 ft.; and above or below power lines transmitting power at under 750 volts, 5 ft., and over 750 volts, 8 ft.

4. Low potential power lines transmitting power at less than 750 volts shall have a minimum clearance above the rails of railroads and street railroads of 30 ft.; above street and public highways, 25 ft.; above or below telegraph and telephone lines and all other low potential power lines of 750 volts or less, 5 ft.; above or below high potential power lines of more than 750 volts, 8 ft.; and above or below all buildings, structures, wires or other obstructions, 5 ft.

5. High potential power lines transmitting power at over 750 volts shall have a minimum clearance

above the rails of railroads and street railroads of 35 ft.; above street and public highways, 30 ft.; above telegraph, telephone and all power lines, and above or below all buildings, structures, wires, or other obstructions, 8 ft.

6. Trolley wires of railroads and street railroads shall have a minimum clearance above the surface of streets and public highways of 19 ft., except in cases where such railroads or street railroads handle standard freight cars when the minimum overhead clearance shall be 22 ft.; above the rails of all railroads, and street railroads handling standard freight cars, 22 ft.; below telegraph, telephone and low potential power lines of less than 750 volts, 5 ft.; below power lines of over 750 volts, 8 ft.

7. The clearances for wire lines provided in Sections 3, 4, 5 and 6 above, have reference to clearances which will obtain under the most unfavorable conditions of temperature and loading.

**Construction of Wire Lines.**

8. Where telegraph and telephone lines cross over railroads or street railroads, the span shall not exceed 100 ft. Where wooden poles are used, these shall have a minimum diameter of not less than 9 inches, and shall be securely guyed to prevent wires from unduly sagging.

9. Where power lines cross railroads, street railroads, telegraph lines, telephone lines or other power lines, they shall be constructed to conform to the "specifications for overhead crossings of Electric Light and Power Lines" adopted for the time current, by the Joint Committee of the National Electric Light Association, American Institute of Electrical Engineers, American Electric Railway Association, Association of Railway Telegraph Superintendents and American Railway Engineering and Maintenance of Way Association, except that the clearances provided in Sections 4, 5 and 6, above, of this order shall be observed.

## LAMP SIGNALS FOR HOTEL MAIDS.

New applications for electrical energy are each day coming into use more and more. Now comes the lamp signal for hotel maids, as set forth in the Electrical Review and Western Electrician.

An elaborate system of lamp signals for locating the housemaids who care for guests' rooms is in use at the Hotel Radisson, Minneapolis, where the office staff find it of the greatest service in communicating with the various floors. In every corridor at the side of the door of each guest-room is a small 2-c.p. incandescent lamp, and on the wall below is a flush-plate contact jack into which on entering the room the maid inserts a plug carried on her key ring. With the plug in place the little lamp over the door is lighted, indicating from any point in the corridor in which room the maid is working. The circuits from these door lamps are in turn grouped in a signal board in the hotel office, so that the lighting of each room lamp is indicated by its corresponding lamp on the annunciator board. If a certain room is to be made ready on short notice, the maid on that floor can be reached by noting in what room her lamp is burning and then calling the corresponding number over the telephone.

## MACHINERY BUILDING AT PANAMA-PACIFIC EXPOSITION.

The Machinery Building, which is to grace the 1915 Universal Exposition, will be the largest of the thirteen exhibition palaces that are provided for in the plans being prepared by the members of the Architectural Commission, and will be the first contract let for the main exhibition palaces. Four heroic statues, representing the personalities who were greatest in the advancement of mechanical arts—Archimedes, Guttenburg, Watt and Edison, will, in all probability, be placed on this building.

## NEWS OF RAILROAD COMMISSION OF CALIFORNIA.

The Railroad Commission rendered a decision August 15 granting the application of the Sacramento Valley Electric Railroad Company to issue 30,000 shares of preferred stock of the par value of $3,000,000 and common stock to the value of $750,000. The company proposes to construct an electric railway down the Sacramento Valley, commencing at Red Bluff and running in a southerly direction through Tehama, Glenn, Colusa and Yolo Counties, to the city of Woodland, and thence to the town of Dixon, in Solano County, where it proposes to connect with the Antioch & Eastern Railway. A branch is proposed to run from Colusa to Williams. The estimated length of the whole project is 160 miles.

Subscriptions have been received for 1600 shares of the common stock, of a par value of $160,000, and $16,000 has been paid in cash. The data filed with the Commission indicates that the line will cost exclusive of rights of way, approximately $4,700,000. It is proposed that the common stock shall be used in exchange for rights of way. In its decision granting the application, the Commission requires that construction work shall not begin until there shall be in the hands of the company $750,000 from the sale of stock. This condition is imposed, in the words of the Commission, "in order that reasonable assurance may be had that the actual construction of this road will not be entered upon before there is sufficient money in hand to warrant proceeding with the scheme." The Commission further requires that monthly detailed accounts of expenditures shall be filed with the Commission, and that all contracts for stock sale or construction work involving outlays of more than $1000 shall be submitted for the approval of the Commission before execution.

The Burbank Electric Light & Power Company filed an application for authority to take over the franchise granted to G. H. Deacon by the town of Burbank, Los Angeles County, and to sell stock for the purpose of operating in Burbank. The company has just been organized and has an authorized stock issue of 2000 shares of a par value of $10 per share.

A certificate of public convenience and necessity has been granted to the Great Western Power Company to exercise franchise rights for the distribution of electric power in Petaluma and Sebastopol, Sonoma County.

An informal conference will be held in the office of the Commission on Tuesday, August 27, at 10 a. m., for the purpose of discussing a proposed uniform system of accounts for the gas and electric utilities of California.

The Commission has granted the application of the Half Moon Bay Light & Power Company for permission to operate in the Jefferson School District, in San Mateo County, and of the Coast Counties Gas & Electric Company to purchase the capital stock of the Gilroy Gas Works for the sum of $25,000.

## IGNITION OF GAS BY MINIATURE ELECTRIC LAMPS WITH TUNGSTEN FILAMENTS.

BY H. H. CLARK.

The Bureau of Mines has been asked a number of times whether fire damp can be ignited by breaking the bulb of a miniature incandescent lamp in a body of it. This matter is discussed in Technical Paper No. 23 of the Bureau.

This question is of more importance now than at any previous time because of the increasing use of portable electric lamps. The development of the tungsten filament has given a fresh impetus to the manufacture of such lamps, and there are now upon the market several types especially designed for mine service. Portable electric lamps are often used where gas is known to be present, and sometimes, as in rescue work, such lamps must be used where gas (methane) may be present in dangerous amounts.

In connection with its investigations of mine accidents and the dangers attending the use of electricity underground, the Bureau of Mines at its experiment station in Pittsburgh, Pa., has undertaken the study of various matters relating to the ignition of fire damp by electrical equipment. The tests described below were made upon miniature incandescent-lamp bulbs and were preliminary to more extensive tests which the bureau plans to make upon complete portable lamp equipments.

Because of the importance of the question put to the bureau and because of the interest that has been manifested, the following brief review of the test results is published in advance of a more detailed description of the investigation, which will appear in another report.

The tests were made with miniature incandescent-lamp bulbs containing tungsten filaments. The bulbs were supplied to the bureau without cost by the General Electric Company, the Federal Miniature Lamp Company, and the National Electric Lamp Association.

In all tests the filaments were glowing at the moment when the bulbs were broken. One hundred and thirty-one bulbs were broken in a mixture of natural gas (that used in Pittsburg) and air combined in the proportion of 8.6 per cent gas to 91.4 per cent air. These percentages of the gas and air form the most explosive mixture.

Forty-five tests were made in gas-and-air mixtures other than the most explosive. These mixtures contained from 3 per cent to 12.4 per cent of gas. Mixtures containing as little as 5 per cent of gas and others containing as much as 12.4 per cent of gas were ignited by 1.5-candlepower, 3.5-volt, 0.3-ampere bulbs that were smashed while burning at rated voltage.

**Tabulation of Results.**

Table 1—Bulbs causing ignition at or before rated voltage.

| Manufacturer's rating C.P. | Volts | Amperes | Number of tests | Number of ignitions | Percentage of rated voltage causing ignition* |
|---|---|---|---|---|---|
| 1.0 | 2.5 | 0.3 | 11 | 7 | 100.0 |
| 1.5 | 3.5 | .3 | 23 | 16 | 100.0 |
| 2.0 | 5.5 | .3 | 9 | 6 | 98.7 |
| 1.0 | 2.0 | .... | 9 | 7 | 100.0 |
| 1.0 | 2.5 | .... | 10 | 3 | 100.0 |
| 2.0 | 4.0 | .... | 10 | 7 | 82.2 |
| 2.0 | 4.5 | .... | 10 | 7 | 85.3 |
| .... | 2.0 | .73 | 5 | 3 | 94.5 |
| .... | 4.0 | .53 | 5 | 5 | 94.9 |
| .... | 6.0 | .30 | 5 | 5 | 88.2 |

Table 2—Bulbs causing ignition at more than rated voltage.

| Manufacturer's rating C.P. | Volts | Amperes | Number of tests | Number of ignitions | Percentage of rated voltage causing ignition* |
|---|---|---|---|---|---|
| 0.5 | 1.5 | 0.4 | 10 | 1 | 132.7 |
| ... | 2.0 | .23 | 9 | 3 | 120.0 |
| ... | 2.0 | .40 | 9 | 3 | 106.0 |
| ... | 2.0 | .53 | 6 | 5 | 102.0 |

*The values given in this column are the average percentages of the voltages impressed upon such bulbs as caused ignition.

## TESTS ON ELECTRIC HEATERS FOR EXPLOSIONS.

Electric heaters are known to be less efficient and less safe than low-pressure steam or hot-water coils for thawing explosives; nevertheless in certain work electricity is the only available sourse of heat. With this consideration in view an investigation of the heating of thaw houses by electricity was undertaken by the authors in co-operation with H. H. Clark, electrical engineer of the Bureau of Mines, described in technical paper No. 18. The dangers encountered are given in order to promote greater safety in thawing explosives when electric heating is the only alternative. In the tests the steam coils of the bureau's experimental thaw house were replaced with electrical means of heating. The conclusions drawn from the results of the tests are as follows:

Electricity will, under certain conditions, produce sparks and flashes sufficient to ignite explosives or to cause fires that may result in such ignition. It is therefore necessary to select and install heating devices, connections, and circuits with reference to the special service which they are to perform. By far the most unattractive feature of electric heating is the probability of obtaining undesirably high temperatures in the immediate vicinity of the source of heat, and also the certainty that there is almost no limit to the temperature which such sources of heat will attain if the emission or diffusion of heat from them is sufficiently restricted.

Low-pressure steam or hot-water coils and electric heaters have characteristics that are exactly opposite. The rate at which steam coils give up heat is variable, depending upon conditions, whereas the rate at which electric coils give up heat is constant.

The temperature of steam coils cannot exceed a certain maximum, which depends upon the pressure of the steam used, regardless of radiation and convection. There is, however, almost no limit to the temperature that may be attained by an electric heater, and its maximum temperature depends entirely upon those factors that affect the emission or diffusion of heat from the heaters. In this instance the most prominent are the weight of air passed per minute, its temperature, and its specific heat; the mechanical design of the heaters must also be considered.

## HIGHEST DAILY STEAMSHOVEL RECORD.

Steamshovel No. 120 (T. P. Kelleher, engineer, and L. P. Bonnell, craneman), working in the west borrow pit for Gatun Dam, on the Panama Canal, loaded 202 large Oliver dump cars containing 3434 cubic yards in the working day of eight hours on July 6. This is 119 cubic yards more than the previous daily Isthmian record for a 70-ton shovel, made by the same shovel and crew on April 2, 1912.

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NOTICE TO ADVERTISERS.

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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**The Panama Canal and Sanitary Development**

Engineers the world over may well investigate the excellent sanitary precautions taken by the authorities at Panama. This district formerly recognized as perhaps the most unhealthy in the world, stands today as a model in all that goes toward modern accomplishment in disease-preventing and health-giving surroundings. Long since it has been said that the sick and the dying found in the camps of war far exceed those taken from the field of battle. The engineer in his perplexing camp organization has had at times more difficult problems to solve in maintaining his followers in healthy service, equipped with every sinew ready for work, than the actual design of the project.

Many little descriptive ideas are already appearing in the technical press relative to camp equipment and sanitary efficiency at Panama. The little sanitary cup, a description of which appears on another page of this issue, but bespeaks the sanitary evolutions of the Isthmus. Undoubtedly the sanitary accomplishments of the Panama Canal project are today the proudest traditions of that great world-beating triumph.

**Boiler Inspection Rules**

Much credit is due the various insurance companies for their enterprise in devising ways and means of lessening the risk to life and property. Their zeal in seeing to it that municipalities have proper fire protection has resulted in the evolution of such accomplishments as the high pressure salt water system in San Francisco. The board of fire underwriters in standardizing and devising rules for approved wiring and electrical construction has brought many a small municipality, too poor to have a regularly employed electrician, to a high state of modern proficiency in risk from electric wires.

For many years no particular rules or designs were followed in the construction of boilers. Each factory or boiler shop insisted upon designing and carrying out its own particular ideas in many cases without reference to the most efficient and safe form of construction. These designs when brought under one cover were in many cases conflicting and at times dangerous. The United States government was the first to formulate rules and regulations in 1836. This was later followed up by the various boiler insurance companies. The rules as devised by the Hartford Steam Boiler Inspection & Insurance Company may be said to have now become standard.

The Pacific Coast has shared largely in the credit due this high state of efficiency in boiler inspection and design. J. B. Warner, chief inspector San Francisco department of the above mentioned insurance company, contributes elsewhere in these columns the beginning of a series of articles which bring down to date the latest ideas in rules for boiler design and inspection.

**The Pacific Highway**

"Good roads for 1915" is the Western slogan of the day. The recent conference at San Francisco wherein representatives from all coast points deliberated as to best methods of boosting the good roads movement and arrive at some effective plan to secure immediate action was interesting in the extreme. The planning of a Pacific Highway having its beginning to the north in Canada, sweeping thence south through the heart of the fertile lands of Washington, Oregon and California, and ending within sight of the Mexican boundary is not that of an idle dreamer, but serious minded men stand ready to give to the project every ounce of attention and effectual promotion necessary for its early consummation.

A discussion of such a gigantic project leads naturally to the consideration of the present availability of the enormous outlay of necessary labor and capital to bring about immediate results. California is already devoting $18,000,000 as a starter in this enterprise and energetic citizens of Washington and Oregon are zealously working to see to it that their neighbor to the south shall not outdo them in their efforts.

Most earnest and convincing dispatches have already been sent to the president of the Mexican Republic by leaders in the movement urging the extension of the project to Mexico City. It is none too early to dream dreams that the future may even see this triumphal highway of the West extended down through Central America on over the Andes to the great Republics of South America and add one more link of brotherhood in thus binding to us the seventy-five million human souls of that promising country.

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**The Oregon Commission Law**

The people of the State of Oregon at an early date are to vote whether or no there shall be a regulating commission over all public utilities within the confines of that great commonwealth. In embarking upon the considerations of commission regulation, perhaps no other factor is so potent for good or bad, as is that of the personnel of those having the drawing up of the enactment in charge.

In California the Public Utilities Act has now been in complete operation for nearly six months and although it is early as yet to draw a complete picture of the far-reaching consequences, yet, in the main, the careful observer cannot help but come to the conclusion that the good results of this law are accomplishing more for the State of California than any other single piece of legislation of the past twenty-five years. Two important factors contributed largely to the success of this commission. The first factor was the careful and studious application with which those fostering the commission idea went about their work. This application ultimately brought forth a law which combines practically all of the good features of eastern regulating commissions. The second factor is that of the personnel of the present commission. The California commission is composed of two middle-aged men and three ambitious young men just on the threshold of life's activity—"the old men for counsel and young men for war." The academic attainments of these young men are of the highest and the university records attest in at least two cases the highest academic standing in their respective graduating classes.

Due to the strong entrenchment of regulating commissions in the larger municipalities of California and their opposition to state-wide control, it was thought best to leave the question of municipal regulation to the local commissions until such time that by affirmative vote of the municipality the state commission would be given authority to act. Unquestionably the wiser regulation is by a state-wide commission. Even now many municipalities of California are either favorably agitating the question of entrusting their utility regulation to the state commission or already have actually passed the necessary measures.

In the passage of a utility enactment in Oregon, the framers of the act would do well to consider the merits of state-wide control—an enactment firm and just to municipality and rural community alike. Most cities do not have the money to retain expert engineers, rate men, statisticians and other expensive equipment for the work. Divided control is always confusing and the recent state-wide extension of transmission lines heightens this rate-making confusion when several separate bodies pass upon the rates. Unquestionably state-wide regulation is conducive of more just results to people and utility alike, for in the majority of cases, local prejudices and local political upheavals—a condition to be absolutely divorced from regulating consideration—enter not in the slightest degree in adjustments of rates and appraisals. Indeed state-wide control has every argument in its favor, not the least among which are the examples of unified state control of all eastern regulating commissions.

In reviewing the accomplishments of the present California commission much credit is theirs for the successful and harmonious deliberations that have been brought about for the common good among public utility managers, lawyers and engineers. As an instance of this may be cited the recent call of the commission to discuss the question of "clearances." In this brief friendly discussion more was accomplished in the way of evolution toward uniformity in design in one afternoon than has been brought about in years of disconnected discussion among the utility engineers and managers.

In conclusion, it may be said that while we feel a slight departure has been made by the California commission in encouraging destructive competition in certain cases, yet in its completeness the wholesome effect of their wise and painstaking investigation and direction of California public utilities is most apparent. In consideration of the present high standing of California public utility securities and every indication of efficient and economic operation of the utility companies under commission regulation, we believe the neighboring State of Oregon would do well to emulate the essential features of California regulation in her forthcoming enactment.

## PERSONALS.

**R. D. Holabird** and family spent the past week at their summer residence on the shores of Lake Tahoe.

**W. Brewster Hall,** Pacific Coast manager for Pass & Seymour, Inc., visited Lake Tahoe during the week.

**C. W. McKillip,** district manager for the Pacific Gas & Electric Company at Sacramento, is a recent San Francisco visitor.

**P. H. Coolidge,** general commercial superintendent of the Pacific Telephone & Telegraph Company, is visiting New York and Boston.

**C. E. Groesbesk,** one of the vice-presidents of the H. M. Byllesby & Company, is at San Francisco with Mrs. Groesbeck, preparing to take a long vacation.

**S. L. Shuffleton,** who has general charge of the Stone & Webster Construction Company's operations on the Pacific Coast, has returned to Fresno from Seattle.

**W. G. Kittredge,** chief engineer of the New York Central Railroad Company, one of the pioneer steam roads in adopting electric traction, is visiting the Yosemite Valley.

**Hugh McPhee,** district commercial superintendent of the Western Union Telegraph Company with headquarters at Los Angeles, is among the week's arrivals at San Francisco.

**S. L. Berry** has resigned as hydraulic engineer for the Joshua Hendy Iron Works and opened offices as consulting hydraulic and mechanical engineer in the Rialto Building, San Francisco.

**Gaskell S. Jacobs,** formerly with the appraisal department of J. G. White & Company, Inc., is now with the Northwestern Division of the Great Western Power Company at Napa, Cal.

**H. R. Noack,** president of Pierson, Roeding & Company, is accompanying **A. H. Babcock,** consulting electrical engineer for the Southern Pacific Company on an automobile trip through Oregon.

**J. E. Fries,** Pacific Coast electrical engineer with the Crocker-Wheeler Company at San Francisco, has been transferred to the grade of member in the American Institute of Electrical Engineers.

**A. F. Bridge,** formerly in the employ of the Great Western Power Company, has returned from an Alaskan trip to assume his duties as a John W. Mackay Jr. fellow at the University of California.

**H. C. Stoddard,** general superintendent of the California-Oregon Power Company, at Medford, Ore., has been transferred to the grade of member in the American Institute of Electrical Engineers.

**H. V. Carter,** president, and **W. L. Goodwin,** vice-president and general manager of the Pacific States Electric Company, are among those attending the jobbers' convention at Lake Tahoe this week.

**J. S. Badger,** general manager and chief engineer of the Brisbane Tramways Company of Brisbane, Australia, arrived at San Francisco during the week en route to the Eastern States on railroad business.

**J. P. Edwards,** consulting electrical and mechanical engineer, Northern Electric Railway, Chico, Cal., has been transferred to the grade of member in the American Institute of Electrical Engineers.

**C. C. Hillis,** general manager of the Electrical Appliance Company, who has been in the East several weeks, is expected to return to San Francisco early next week after spending a few days at Lake Tahoe.

**H. J. Bosch,** formerly assistant to J. P. Jollyman of the Pacific Gas & Electric Company, has joined the Panama-Pacific International Exposition Company as an assistant in the electrical department.

**H. G. Dickson,** superintendent of the erecting department of the Babcock & Wilcox Company, is a recent San Francisco visitor and attended the engineers' club dinner at the Palace Hotel last Tuesday noon.

**I. L. Capps,** formerly with the lamp department of the General Electric Company, has accepted a position with the Pacific States Electric Company and will have charge of the lamp sales for them in the San Francisco district.

**H. C. Goldrick,** Pacific Coast manager for the Kellogg Switchboard & Supply Company, is visiting Humboldt County with his brother, Paul Goldrick, an electrical supply man who recently arrived in California from Indianapolis.

**C. F. Peirson,** manager of the advertising department of the Southern California Edison Company, has returned to Los Angeles from a month's vacation, which included an automobile tour of eastern California and western Nevada.

**R. F. Chevalier,** consulting engineer, has returned from Los Angeles where he has been conducting tests upon the new oil burners of the Union Iron Works Company at the Long Beach plant of the Southern California Edison Company.

**R. W. Sorensen,** professor of electrical engineering at Throop Polytechnic Institute at Pasadena and delegate from Los Angeles to the national meeting of the American Institute of Electrical Engineers, has returned from a two months' Eastern trip.

**H. M. Hepburn,** general manager of the Hawaiian Electric Company, Ld., which holds the agency for the Westinghouse Electric & Manufacturing Company in the Islands, besides furnishing electric power, lighting and ice at Honolulu, is at San Francisco.

**Emil Liersch,** engineer for the Ferrum Pipe Company of Germany, represented exclusively in the United States by the Pelton Water Wheel Company, is at San Francisco on business connected with a lap-welded pipe contract in which the Pelton Company is interested.

**W. A. Hillebrand,** professor of electrical engineering at the Oregon Agricultural College, and **Robert Sibley,** professor of mechanical engineering at the University of California, and editor of this journal, have been appointed western members of the educational committee of the A. I. E. E. by President Mershon.

**John R. Freeman,** the engineering expert who made a report on the Hetch-Hetchy valley water supply, recently inspected the work in progress at the site of the Great Western Power Company's dam at Big Meadows. The rock has been uncovered for some distance and a large construction force is now placing concrete at the base of the new dam.

**A. W. Bullard,** general manager of the Great Western Power Company, states that a contract has been awarded to the I. P. Morris Company for two additional water wheels for the extension of the Las Plumas power station at Big Bend. The two turbine wheels of the Francis type are rated at 18,000 h.p. each. They will have vertical shafts and will be similar to the other wheels now in use.

**R. G. Hanford,** who is interested with F. M. Smith and W. S. Tevis in the United Properties Company, the holding corporation for several light and power plants in San Francisco and local electric traction lines in Alameda County, has returned to California after a four months' trip abroad. While in Great Britain he conferred with bankers who have helped to finance his large enterprises. **George H. Taylor,** a Chicago financier, who was one of the underwriters for the Key Route transportation system, is also at San Francisco.

### JOBBERS AT LAKE TAHOE.

The Pacific Coast electrical jobbers are enjoying an outing at Lake Tahoe this week. Those in the party include H. V. Carter, T. E. Bibbins, C. B. Hall, J. A. Vandegrift, Albert H. Elliott, W. L. Goodwin, C. H. Carter, Ross Hartley, C. R. Dederick, W. Brewster Hall, H. E. Sanderson, C. E. Wiggin, S. B. Gregory, Duncan Reynolds, Garnett Young, G. I. Kinney, Frank Fowden, A. E. Barlow, F. H. Murray, W. I. Berry, R. D. Holabird, C. C. Hillis.

### THE ENERGY CLUB.

The Energy Club is the outgrowth of a series of lunches which have been held at the Palace Hotel, San Francisco, on Wednesday, by a number of central station men and electrical manufacturers. On August 22 a constitution was adopted and an executive committee elected. Membership is open to anyone interested in power apparatus. No dues will be collected. The executive committee consists of R. L. Van der Naillen, T. E. Bibbins, A. W. Bullard, W. W. Briggs and S. V. Walton, Mr. Bibbins being chairman, and Mr. Walton secretary.

### JOVIAN CLUB OF SAN FRANCISCO.

The San Francisco members of the Rejuvenated Sons of Jove perfected the organization of a lunch club at a meeting held at Tait's cafe on August 20. Weekly meetings are to be held at lunch on Tuesday. The committee on the constitution and by-laws, consisting of C. F. Butte, R. M. Alvord, W. W. Hanscom and A. H. Halloran, submitted its report, which was accepted, and suggested the names for the governing board, who were elected to hold office until a new election takes place. The members of the board are R. M. Alvord, Geo. C. Holberton, W. W. Hanscom, W. S. Hanbridge, and W. I. Otis. It is planned to hold the next rejuvenation on September 10th.

### CALIFORNIA ELECTRICAL CONTRACTORS' ASSOCIATION NOTES.

The Electrical Contractors and Dealers' Association of San Francisco held a meeting last Tuesday at the Mayor's office which was attended also by Mayor James Rolph Jr. and the Architectural Commissioner. As a result it has been decided that, in future, on all municipal building jobs the total cost of which is $50,000 and over, the same shall be confined to about twelve separate contracts. This is a victory for the specialty contractors.

The John G. Sutton Company has been awarded a contract for a five-story apartment house at Van Ness avenue and Bush street for James Sweeney. The electrical work amounts to about $3400. The same contractors have also taken a $1900 contract to wire a new building that is to be erected on Jessie street between Annie and Third for the Sharon Estate.

The Butte Engineering & Electric Company has been awarded the electric work on an apartment house on the corner of Post and Fillmore streets for $4000.

The Central Electric Company has secured a $3000 electric contract on a building for Ray Levin at Sacramento.

### NEW CATALOGUES.

Butte Engineering & Electric Company, San Francisco, have issued a catalogue of special electrical apparatus which they manufacture, including electric heaters, regulators, indicators and switchboards.

Bulletin No. 1091 from The Ideal Electric & Manufacturing Company, constitutes one of the most valuable and complete treatises on Elevator Motors which has been published. It includes a number of curves and tables on hoisting requirements.

The engineering department of the National Electric Lamp Association has just issued bulletin 2A, which set forth in an attractive manner the methods employed by the association in securing their engineering data. Bulletin 2B, just issued, covers the description and performance of gem metallized filament lamps. Bulletin 3B is devoted to the description and performance of gem metallized filament lamps, with data on the cost of producing light with them.

Switchboard Meters is the title of an attractive publication with an art cover just issued by the Westinghouse Electric & Manufacturing Company which very fully describes the complete line of switchboard meters recently brought out by this company. In addition to describing and illustrating these meters, the circular contains reprints of papers by Mr. Paul McGahan on (1) Modern Tendencies in the Design of Switchboard Indicating Meters, and (2) Theory and Performance of Induction Instruments.

### BOOK REVIEW.

**Walker's Manual of California Securities and Directory of Directors,** 1912 edition. Compiled by H. D. Walker. For sale by Technical Book Shop, San Francisco. Price $3.00.

The 1912 edition of this valuable reference work gives the facts about a large number of companies not mentioned in the 1911 edition. One of the most valuable of several new features incorporated are maps of the properties of several of the electric power companies.

**Electrical Blue Book—1912 Edition.** Size 9x11½ inches; 206 pages; replete with illustrations; compiled and published by the Electrical Review Publishing Company of Chicago and for sale by the Technical Book Shop, 106 Rialto Building, San Francisco.

This book contains a comprehensive exhibit of officially approved electrical supplies, to which is added an illustrated list of other representative lines of electrical material and the National Electrical Code, illustrated and explained. Much confusion and poor installation constantly exists due to imperfect knowledge as to just what comprises the approved form of electrical work. Here is a book replete with the desired information. No contractor or wireman can afford to be without this latest edition.

**Primer of Scientific Management.** By Frank B. Gilbreth, with an introduction by Louis D. Brandeis. Size 5x7½ in.; 108 pages; no illustrations; cloth binding. Published by D. Van Nostrand Company of New York and for sale by the Technical Book Shop, Rialto Bldg., San Francisco. Price $1.00.

The author, Frank B. Gilbreth, is well known to those interested in the advancement of scientific management in the industries, as evidenced by the wide circulation enjoyed in his works on motion study, concrete system, bricklaying system and fuel system. The book before us is treated in the question and answer form. These questions are chosen from hundreds that have come to the author from all parts of the world, with requests for further information on the subject of the elimination of unnecessary waste in human effort. The growth of scientific management is a nation-wide movement looking toward industrial betterment for the manufacturer and the laborer—one in which minimum human effort is put forth for maximum return to mankind. The book adds another chapter in this growth and all interested will find these miscellaneous questions and answers of the same profit as the discussion of a technical paper always bears to the main issues presented. The questions are arranged in logical order and are presented under five main headings—definitions of terms of scientific management, laws or principles, application of the laws, the effect on the work, and the relation of scientific management to other lines of activity.

## A SATISFACTORY LICENSE LAW FOR ELECTRICAL CONTRACTORS.

The only state license law for electrical contractors which has been upheld by the courts is that of Tennessee. Believing that its provisions will be valuable in suggesting those for other states it is printed in full as follows:

An Act to regulate, in cities of more than 75,000 inhabitants, according to the Federal Census of 1900, or any subsequent census, the licensing of persons, firms and corporations conducting or managing a business for installing any wires or electrical apparatus to convey electrical current for light, heat or power, and to provide for a Board of Electrical Examiners and Supervisors for said purpose and to prevent the doing of such electrical work by persons, firms or corporations other than those licensed in accordance with the provisions of this Act, and to provide a penalty for the violation thereof.

Section 1. Be it enacted by the General Assembly of the State of Tennessee, That within thirty days after the passage of this Act the Governor shall appoint in each city in the State of Tennessee, of more than 75,000 inhabitants, according to the Federal Census of 1900, or any subsequent census, a Board which shall be known as the Board of Electrical Examiners and Supervisors, consisting of three persons, for the purpose of examining into the qualifications and capabilities of Master Electricians, as defined by Section 5 in this Act.

The members of said Boards so appointed shall be competent practical electricians, one of whom shall be nominated by the oldest existing association of electrical contractors in the city of his appointment, and if no such association exists, then he shall be a contracting electrician who has been publicly engaged in such business in the city of his appointment for at least three years prior to the date of his appointment; the second to be nominated by the Chief of the Fire Department, and the third by the Local Association of Fire Underwriters, if any such association exist in the town where the appointment is to be made; and if no such association is in existence, then the third member to be appointed upon the nomination of the two members hereinbefore designated. The term of each member shall be one year from date of appointment. Should any vacancy occur from any cause during the term of any Board as herein provided, the Governor shall appoint some one from nominations made as above provided, to fill such vacancy, and this in such manner that the various Boards shall continue to be constituted as herein provided.

The Governor shall have full power to remove any member of the Board for incompetency or improper conduct, upon satisfactory evidence thereof being presented to him.

Section 2. Be it further enacted, That the members of said Board shall respectively take and subscribe to oath required of State officers. They shall have the power to elect, out of their number a president, a secretary and a treasurer; to adopt such rules and by-laws for the transaction of the business of the Board as they may deem expedient.

Section 3. Be it further enacted, That each member of said Board shall receive a compensation of Five ($5.00) Dollars per day for actual service in attending meetings of the Board, which compensation shall be paid out of the moneys in the hands of the treasurer of said Board; Provided that the secretary of said Board may receive such additional compensation as the Board may deem just and reasonable, and for which the by-laws of the said Board may provide. In no event, however, shall the compensation of the members of the said Board or their secretaries be paid out of the funds in the State Treasury or become a charge against the State; but the compensation of all members of said Board, including the secretary, shall be paid out of fees collected by said Board, under the provisions of this Act.

Section 4. Be it further enacted, That said Boards shall meet at least once each month in their respective domiciles, and shall hold special meetings as frequently as the proper and efficient discharge of their business shall require, and each Board shall adopt rules and regulations for the examination of master electricians as herein defined, and when so adopted, such rules and regulations shall have the same force and effect as if herein contained; and the rules of said Board shall also provide for the giving of timely notice of such meetings to all those who shall have made application for a license, as herein provided; and said Board shall give in writing, to the respective cities, or to any officer designated by the Legislative Council thereof, a detailed statement of all licenses issued, renewed or revoked at any meeting of said Board. A majority of its members shall organize each of said Boards and constitute a quorum for the transaction of its business.

Section 5. Be it further enacted, That the term "Master Electrician" as used in this Act, shall be so defined as to include any and all persons, firms and corporations engaged in the business of, or holding themselves out to the public as engaged in, the business of installing, erecting or repairing, or contracting to install, erect or repair electric wires or conductors, to be used for the transmission of electric current for light, heat or power purposes, or moldings, ducts, race-ways or conduits, together with fittings for same, for the reception or protection of such wires or conductors, or to electrically connect electric wires or conductors together, or to any electrical machinery, apparatus, device or fixtures to be used for electric light, heat or power purposes.

A license of "Master Electrician" issued or granted under and in accordance with the provisions of this Act, shall entitle any such person, firm or corporation so licensed to engage in the business of installing, erecting or repairing, and of contracting to install, erect and repair, any electric wires or conductors to be used for the transmission of electric current for electric lights heat or power purposes, and any moldings, ducts, race-ways and conduits, together with fitings for same, to be used for the reception and protection of such wires and conductors, and to electrically connect such electric wires or conductors together and to any apparatus, devices, fittings or fixtures to be used for electric light, heat or power purposes.

Section 6. Be it further enacted, That before any person, firm or corporation shall hereafter engage in the business of a "Master Electrician," as defined in Section 5 of this Act, and before any person, firm or corporation now so engaged in said business, or any branch or class thereof, shall continue in said business of "Master Electrician," such person, firm or corporation shall apply to said Board for a license to practice as "Master Electrician," and the applicant, if a person, or if a corporation, one of the officers or a representative and agent thereof, to be designated by said corporation, or if a firm, one of the members thereof, shall present himself before the said Board at a time and place fixed by the said Board. If the Board shall find, upon due examination, that the applicant presenting himself is of good moral character, has a satisfactory knowledge of electricity and the natural laws appertaining to and governing the same, and of the use and function of electric wires, appliances and devices for electric light, heat and power purposes, and is possessed of skill and knowledge in all matters pertaining to the business of a "Master Electrician," as defined in Section 5 of this Act, the said Board, upon payment of the fee, and upon giving bond, hereinafter provided for, shall issue to the said person, firm or corporation a license as "Master Electrician" to practice said business for a term of one (1) year and shall register such person firm or corporation as duly licensed "Master Electrician."

Provided, That no license shall be granted to any person, who has not taken and subscribed an oath that he, or in

case of a corporation, one of the principal officers of the representative and agent thereof, and, in case of a firm, one of the members thereof, has had at least three (3) years' actual experience as a Master Electrician, within the terms of this Act, or as an electrical workman, in such class or classes of electrical business or work as in the opinion of the Board, shall have properly fitted the applicant for a license as Master Electrician.

Provided further, That each applicant, at the time of filing his, their or its application, shall pay to the secretary of said State Board of Electrical Examiners the sum of Twenty-five ($25) Dollars and provided, moreover, that every person, firm or corporation, before receiving a license, shall make, execute and deliver a bond to the State of Tennessee in the full sum of Twenty-five Hundred ($2500.00) Dollars, with sufficient surety or sureties, to be approved and filed with the said Boards, the bond to save harmless the owner or real party in interest in the property for which any such material furnished, or service performed, against loss or damage which shall arise by reason of the work done or material furnished being in violation of and below the standard of the current edition of the National Electric Code; but action can be maintained thereon in the name of such owner or real party in interest only, if commenced within one (1) year from and after the date of the installation of the materials furnished or performance of such work or service.

When however, the material furnished or work done, or service performed, shall have been inspected, and a written or printed certificate of approval issued by a legally authorized city electrical inspector, then the said Master Electrician shall be considered as having fulfilled the requirements of this Act, and his responsibility shall cease under the above bond for material furnished and work or service performed.

Section 7. Be it further enacted, That all persons, firms or corporations that at the time of the enactment of this Act are engaged in the business which shall be hereafter known as the business of a Master Electrician as described in Section 5 of this Act, shall, within sixty days after the passage of this Act, comply with all the provisions of Section Six (6) of this Act, or such persons, firms or corporations, shall, within 60 days after the passage of this Act, cease to do the work which shall be hereafter known as that of a "Master Electrician" as described in Section 5; otherwise, he, they or it, shall be guilty of a misdemeanor and, on conviction, suffer the fines and penalties set forth in Section Fourteen of this Act.

Section 8. Be it further enacted, That each and every license issued under the provisions of this Act shall be signed by the president and secretary of the Board and attested with its seal and said license so signed and attested, for a period of one year, shall be evidence in any court in the state of the business for which the license is issued. All licenses and renewals of same shall expire on the first day of January, of each year.

Section 9. Be it further enacted, That no person, firm or corporation, granted a license under the provisions of this Act, shall continue in the business of installing or repairing electrical wires conductors or apparatus for electric lights, heat or power purposes after the expiration of the said license, unless the said license or extension of same shall have been renewed, as hereinafter provided.

Upon payment of a fee of Ten ($10.00) Dollars, any person, firm or corporation, granted a license under the provisions of this Act (unless the said license shall have been revoked as hereinafter enacted) shall be granted a renewal of said license without examination of the applicant if application therefore is made either in person or in writing to the said Board by the holder of such license within the three months preceding the expiration of such license upon payment of a fee of Ten ($10.00) Dollars and the said renewal of said license shall be made for a period of one (1) year, and shall be signed and attested, as required for such original license, and any such renewal of such license so signed and attested shall have the same weight as evidence in any court in this state as is hereinbefore accorded said original license.

Provided, also, That further one-year renewals shall be granted in like manner, upon expiration of any renewal of license upon making application and paying a like fee within three months preceding the expiration of such renewal, in the same manner as provided for the first renewal.

Section 10. Be it further enacted, That after a full hearing of all parties in interest, said Board shall have power to revoke, for proper cause, any license, or renewal of same, granted by the same Board.

Section 11. Be it further enacted, That each and every license and renewal of same shall be in force and effect only so long as an approved bond, filed with the said Board, in accordance with the provisions of Section 6 of this Act, shall remain in force, and every such license, or renewal of same, shall become void by the termination of said bond, regardless of the regular date of expiration of the said certificate, license or renewal.

Section 12. Be it further enacted. That any and all persons, or corporations, granted a license, or renewal thereof, in accordance with the provisions of this Act, shall display the same in a conspicuous place, in the office or place of business of the person, firm or corporation to which it was issued.

Section 13. Be it further enacted, That nothing in this Act shall be so construed as to prevent any person from doing or performing any of the kinds of work enumerated in Section 5 of this Act, when such work is performed under the direction and supervision of a duly licensed Master Electrician; but no work other than minor electric repairs, for the maintenance of established plants, shall be performed, excepting under such direction and supervision of a duly licensed Master Electrician, and the said licensed Master Electrician shall be responsible for any work, and all work, so done under his direction and supervision. This shall be construed as exempting lighting companies and electric railway companies from the provisions of this Act insofar as the maintenance and installation of their equipment, pole-lines, services and meters are concerned.

Section 14. Be it further enacted, That any person, firm or corporation, who shall practice or engage, or continue in the work of a Master Electrician, as defined in Section 5 of this Act, and any person not licensed as a Master Electrician, who shall do or perform any such work, except under the direction of a Master Electrician, or who shall violate any of the provisions of this Act, shall be guilty of a misdemeanor, and, upon conviction thereof, shall be sentenced to pay a fine of not less than Ten ($10.00) Dollars, nor more than One Hundred ($100.00) Dollars, or to an imprisonment not exceeding thirty (30) days, or both, in the discretion of the Court.

Section 15. Be it further enacted, That no license, or renewal of same, granted or issued under the provisions of this Act, shall be assigned or transferrable, and every such license or renewal of same, shall specify the name of the person, firm or corporation to whom it is issued, and in case of firm, the member of said firm, and in case of a corporation, the principal officer or the designated representative of the said corporation through whom the application for the said license was made.

Section 16. Be it further enacted, That all fees collected under the provisions of this Act, shall be for the use of said Board, to defray its necessary expenses.

Section 17. Be it further enacted, That it shall be the duty of each of said Boards, before the first Monday of January of each and every year, to make a report in writing to the Governor of the state, containing a detailed statement of the nature of the receipts and the manner of expen-

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# INDUSTRIAL

## NEW CUTLER-HAMMER FEED-THROUGH OR CORD SWITCH.

The use of a feed-through or cord switch at the table provides convenient means for controlling the current to heating devices. It eliminates the necessity for getting up to operate the fixture socket or for pulling the base plug. Pulling the cord plug of the device often results in spilling a cup of coffee or other accident so embarrassing at the table. The new brass shell cord switch made by The Cutler-Hammer Manufacturing Company of Milwaukee, because of its small dimensions and polished nickel finish is particularly suited for use with heating devices at the table. Convenient operation is provided by simply pushing the button of the switch placed near the device. It is not necessary to hold the switch with one hand and operate it with the other. When used with electric irons it saves the wear on the socket and allows easy and frequent opening and closing of the circuit. When installed the cord passes through the switch, bushings being provided in both caps.

New Cutler-Hammer Feed-Through or Cord Switch.

The new insulating material developed in the Ceramic Laboratory of The Cutler-Hammer Manufacturing Company, is used as the body of the switch. This material is tough, withstands hard usage and holds in permanent alignment the small compact operating mechanism, which is similar to that used in the "Acorn" pendent switch recently marketed. This new switch is approved by the Underwriters' Laboratories and bears their label. The rating is 3 amperes, 250 volts, 5 amperes, 125 volts. The illustration is full size.

## TRADE NOTES.

F. A. Richards, manager of the car department of Pierson, Roeding & Co., has returned to San Francisco from Vancouver, B. C., where he closed a good order for city cars for the British Columbia Electric Railway Company, Ltd. The contract calls for 35 P.-A.-Y.-E. Brill semi-convertible cars for single end operation. The car bodies are to be 43 ft. long. The motors and air brakes will be let separately. Richards says business conditions in British Columbia are quite encouraging.

The Duncan Electric Manufacturing Company is announcing, through its San Francisco representative, Mr. G. A. Wilbur, that it is now prepared to furnish "Duncan" meters, both a.c. and d.c., equipped with its new cyclometer dials. These meters register direct in numbered kilowatt hours, and can therefore be easily read by consumers. This will put an end to many disputes and the company thinks it is only a question of time when this form of meter will be universally used.

The General Electric Company has been awarded a contract for the generators and a lot of auxiliary apparatus for one of the Big Creek power stations of the Pacific Light & Power Company. The specifications call for: Two 17,500 kw., 375 r.p.m., 6600 v., 3 phase, 60 cycle water-wheel type generators. Also, one induction motor exciter set and one water-wheel driven exciter. Switchboards for this power station and for the Big Creek substation are also included in the contract. Also, one 15,000 kva., 375 r.p.m, 6600 volt, 50 cycle, 3 phase, synchronous G. E. condenser, will be installed at the Big Creek substation, about 135 miles from the power station, for voltage regulation on the 275-mile transmission line to Los Angeles. This machine is so designed that it can be used in the future, if desired, to drive a 3000 kw. direct current generator. Six water cooled, 50 cycle, 4500 kva., 150,000 v./18,000 v. transformers and 3 W.C. 5000 kva., 15,000 v./6600 v. transformers complete the list of apparatus ordered.

The Great Western Power Company's new office building, at 233 Post street, has been equipped with two large vertical electric signs that attract much attention. The Federal Sign System was adopted and flashes of lighting appear to dart along the words "Electric Service." One of the signs bears the initials of the Great Western Power and the other those of the City Electric Company. The appliance department now has a complete display of its electrical goods in the large room on the ground floor.

An attractive exhibit will be made by the Pacific States Electric Company at the Second Annual Melon Carnival, to be held in Turlock Cal. on September 21st to 24th, inclusive. Washing machines, vacuum cleaners, ozonators, cooking and heating devices in operation should prove a great drawing card for the electrical part of the exposition and will doubtless keep the several men in attendance busy explaining the merits of the various devices, including the "Easy" washing machine, which cleans clothes by the vacuum process. The booth will be in charge of M. L. Scoby and B. Badnan.

An interesting hydroelectric plant is being built by the Sierras Construction Company at Laws, Inyo County, Cal. for the Nevada California Power Company, now known as the Southern Sierras Power Company. This plant consists of three 3600 h.p. water wheel equipments driving engine type generators and is to supply the San Gabriel Valley and Los Angeles territory over the longest single transmission line in the world, this being 234 miles long. The water wheel equipment involves several novel features, including a complete Henry automatic water economy apparatus which provides maximum water economy equivalent to the best turbine practice with an absolute absense of water ram or pressure fluctuation in the pipe line and at the same time effects most accurate speed regulation. The use of apparatus of this nature is being demanded by all of the best power installations in order to increase the power salable from a given water quantity available. Contracts for the hydraulic apparatus have been let to George J. Henry Jr., 733-9 Rialto Building, San Francisco, Cal.

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diture, and any balance of money remaining at the end of the year, after payment of expenses, including per diem of members of said Board, and other necessary expenses incurred by them in the discharge of their duties, shall be deposited in the State Treasury.

Section 18. Be it further enacted, That all laws, and parts of laws, contrary to, or in conflict with, the provisions of this Act, be and the same are hereby repealed.

Section 19. Be it further enacted, That this Act shall take effect from and after its passage, the public welfare requiring it.

# NEWS NOTES

## ILLUMINATION.

BAKER, ORE.—This place is asking bids for city lighting.

NAMPA, IDAHO.—C. M. Talmadge, of New York, who secured a power site on the Canyon canal, will start work at once.

LOS ANGELES, CAL.—As a part of a general plan to establish a "Great White Way" the whole length of San Fernando Valley, citizens of Van Nuys August 10 voted to organize a lighting district.

HOUSTON, TEX.—Work has started on a new gas reservoir for Houston. A tank costing $250,000 and capable of holding 3,000,000 cu. ft. of gas will be completed by March 15, 1913; 13,000 ft. of concrete will be used for the foundation.

PHOENIX, ARIZ.—The Pacific Gas & Electric Company of this city has been purchased by a group of men who thus became heavily interested in local affairs. F. S. Viele and R. S. Masson of Los Angeles are in the city to take possession.

BERKELEY, CAL.—A voluntary reduction of from 7c to 5c a kilowatt hour in the cost of electric current for commercial purposes has been announced to the Berkeley City Council by the Pacific Gas & Electric Company. For power purposes the rate is reduced from 5c to 3c.

KAMLOOPS, B. C.—A complete report of the hydroelectric plant on the Barrier River and a steam auxiliary equipment for the city, which Dutcher, Maxwell & Company have had in preparation for several months, has been submitted to the Council. It is estimated that the plant will cost $237,600 and will generate 2000 h.p.

LOS ANGELES, CAL.—A meeting of the stockholders of the Central California Gas Company will be held at 10 o'clock a. m., September 25, at the office of said company, in the International Bank Building, for the purpose of considering and acting on the matter of creating a bonded indebtedness of said company in the sum of $500,000.

FRESNO, CAL.—An expenditure of $65,000 in installing in Fresno a system of gas mains is announced by Manager W. M. Henderson of the Pacific Gas & Electric Company. A force of 150 men is already in Fresno ready to begin work. Under the new system of gas mains Fresno will have pipes as large as 16 inches, while the largest pipe hitherto has been 12 inches, and that only extends for a half dozen blocks. The installation of big mains will do away to some extent with the high-pressure pipes, which are subject to a high percentage of leakage.

WASHOUGAL, WASH.—The Northwestern Light & Power Company has a force of men working at this place resurveying the route laid out a year ago and setting the stakes for poles for the transmission of power. It has unloaded three or four cars of a variety of line equipment. All the right of way between here and the power dam has practically been secured and work is being pushed along the line in this region as fast as possible. The surveyors and engineers have opened an office in this city and work out from here.

LOS ANGELES, CAL.—At a meeting of officials of the Midway Natural Gas Company and the gas distributing companies of this city important steps were taken in the negotiations for the delivery to all city consumers of natural gas which is soon to be brought here from the Midway field in Kern County by the Midway Gas Company. The gas is of the highest quality and the supply is practically unlimited. It will be delivered here by the Midway company through two great pipe lines, the laying of which is costing $4,000,000. These lines will have a capacity of 75,000,000 cubic feet daily. The present consumption of the city and vicinity is about 20,000,000 cubic feet daily. The Midway Gas Company is the operating and constructing company. Its officers are John Martin, San Francisco, president; W. G. Kerckhoff and A. C. Balch of this city, and Cyrus Pierce of San Francisco, directors. The laying of the first pipe line, work on which is now nearing completion, is a triumph of engineering efficiency. Work was begun last April. Three crews are now closing gaps in the middle of the line at the rate of a mile a day. The man in charge of this big engineering feat is William E. Barrett. H. B. Dougherty is superintendent of construction. The first line is of 12-inch pipe and will cost about $1,500,000. The second line will be a 16-inch pipe and will cost $2,500,000. These lines will have a delivering capacity of 75,000,000 cubic feet a day. If the plans for complete abandonment of the use of artificial gas are consummated elaborate provision will be made to safeguard all gas consumers against any possible chance of an interruption of supply. Ten patrol stations will be located along the pipe line and the line will be carefully and continually watched night and day. According to officers of the Midway company this city is to have natural gas not later than next April. Upon the negotiations now in progress depends whether or not the manufacture of artificial gas is to cease entirely.

## TRANSPORTATION.

CORVALLIS, ORE.—Active work of clearing the right of way and grading for the Oregon Electric is going on across the river from here.

VANCOUVER, WASH.—It is announced that the Washington-Oregon Corporation will build an electric line from Sifton to Camas if a $20,000 bonus is raised.

PORTLAND, ORE.—Six thousand people have petitioned for an extension to the Mount Tabor car line, and the petitioners agree to pay $10,000 toward the construction of the line.

PORTLAND, ORE.—Fred A. Jacobs Company has asked for a permit to construct the Errol Heights Railway, to be a short line from Errol Heights to connect with the city street car lines.

EUGENE, ORE.—A contract for building the Monroe-Eugene line of the Portland, Eugene & Eastern Railway, has been let to Flagg & Standiter, the contract covering about 25 miles of roadway.

SALEM, ORE.—A 35-year franchise has been granted to the Portland, Eugene & Eastern Electric Railway. This means the expenditure of $1,000,000 by that company within the city limits during the year.

LOS ANGELES, CAL.—The tramway system of the city of San Luis Potosi has been sold by its Mexican owners to an English company, consisting of Messrs. Hooghwihkel, Brown and partners of London. The new owners will electrify the line.

ELLENSBURG, WASH.—French capitalists who are promoting the electric road between Cle Elum and Roslyn are considering a tunnel through the Cascade mountains to tap the Sound country, it is reported. The French concern owns a power site at Salmon La Sac.

WENDELL, IDAHO.—J. W. Crowley of the Crowley-Salisbury Construction Company of Davenport, Ia., and J. Stewart Clark of Buffalo, N. Y., are promoting an electric line between this place and Hagerman, the road to be 15 miles long. It is expected that construction work will start this fall.

CHEHALIS, WASH.—Work on the Chehalis-Toledo electric road has been resumed and will now be rushed to completion. The graders are at work at a point six miles out of Chehalis. This interurban line will connect one of the thickest settled communities in Southwest Washington with a railroad.

OLYMPIA, WASH.—A copy of a resolution has been filed with the secretary of state which was adopted at Philadelphia at a meeting of the Washington & Oregon Corporation, authorizing and directing the extension of the Chehalis-Centralia Interurban line from the Centralia terminus in Lewis county by way of Tenino to Tumwater.

BOISE, IDAHO.—The first step of the consolidated company which has taken over the Boise Valley, The Boise Railway and the Boise & Interurban electric lines, has been to look over the field with a view of making extensive improvements. One of these improvements will be constructing a loop to take in the north end of the city.

PHOENIX, ARIZ.—M. H. Sherman of Los Angeles, owner of the Phoenix Street Railway Company, will shortly begin the erection of a four-story building at the corner of Washington street and Second avenue. The structure will have connection with the reorganization of the street railway system and will be used for a central transfer station and offices.

SEATTLE, WASH.—It is reported that Wm. D. Hall, vice-president of the Grote-Rankin Company, J. S. Wheeler, of Wheeler & Heath, New York block, and S. L. Cravens, president and manager of the Pacific Lumber & Timber Company, will build an interurban line from this city to Olympia via Tacoma. The company will be known as the Seattle-Tacoma-Olympia Railway Company and is incorporated for $1,500,000.

SAN FRANCISCO, CAL.—The Board of Public Works at the last meeting considered W. D. Donald for inspector of car construction for the Geary street road, the duties to consist of making examination of the cars manufactured for the municipal line. He was recommended by City Engineer Manson and Commissioner Fraser. Minor changes in the construction plans for the new cars were approved. The board received eight bids for the underground conduit from Kearny street to Presidio avenue, which is to contain the feed wires. The lowest offer was submitted by Gruve & McCafferty, $26,901, and the highest, $41,409.50, by the Contra Costa Construction Company.

BURLINGAME, CAL.—Ansel M. Easton, capitalist and founder of the town of Easton, is en route to Europe, where he will confer with Ambassador and Mrs. Whitelaw Reid on the financing of a system of street railways in Burlingame. He plans to return to the United States next month, arrange for a shipment of rails from Philadelphia, place an order for car equipment and begin construction of the local lines early in the spring. Easton holds a franchise for a street railroad through the town of Easton, in the northern district of Burlingame, and if present plans are carried through, an attempt will be made to secure other franchises in the central and western districts of the city.

PUYALLUP, WASH.—At a public meeting in Sumner, landowners between Sumner and Orting voted to file suit against the Stone & Webster interests for the recovery of seven miles of right-of-way granted nine years ago for the construction, as they allege, of a street car line between the two towns. Judge M. J. Gordon of Tacoma has been retained as counsel for the landowners and will file suit in the name of F. A. Stanblow. It is alleged by the valley landowners that they were induced to part with their land for a small consideration in money and the further consideration that an electric car service would be installed, and, further that it was the real intention of the company to use the right-of-way solely for carrying electric power from Electron to Seattle and Tacoma, as is now done.

RICHMOND, CAL.—The Southern Pacific Company has commenced the work of extending its electric system into Richmond. A work train and 150 men started grading at the junction of Twenty-third street and the Cutting boulevard. The B. W. Perrin Company has the contract for the work, which will cost $1,035,000, and will be completed in ten months. The extension, including the loop line in Richmond, will be nine miles long. The new line will connect with the Ninth street line at its terminal in Albany. The line will run from the Southern Pacific station in Pullman at the base of El Cerrito Hill, westward on Cutting boulevard to Washington avenue in Point Richmond. The proposed loop line, for which the company is now seeking a franchise, will run from the corner of Washington avenue and Cutting boulevard through West Richmond and Wall's second addition to Richmond back to the main line tracks of the Southern Pacific at Albany. The streets in the addition in which it is proposed to extend the line have not yet been named. The Richmond Council, at its meeting Monday, authorized the widening of Cutting boulevard to a width of 110 feet for the entire distance of five miles from Pullman station to Point Richmond.

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## TELEPHONE AND TELEGRAPH.

GLENDORA, CAL.—The Board of Trustees will receive bids up to September 3 for a franchise granting the right to carry on a general telephone and telegraph business in this city.

RIALTO, CAL.—The City Council will receive bids up to October 1 for the right to erect poles, wires, conduits, and cables for the transmission of electricity for telephoning and telegraph purposes.

SPOKANE, WASH.—A new telephone exchange costing $9000 will be installed at St. Maries, Idaho, by the Interstate Telephone Company, Ltd., which will have 1000 telephones placed at its disposal after the completion of the work.

PORTLAND, ORE.—Attorneys for the Home Telephone & Telegraph Company were unsuccessful in their efforts before Circuit Judge McGinn recently to secure the dissolution of the temporary injunction granted last week by Judge Gantenbein restraining the ousting of the Bell telephones from the Multnomah Hotel in favor of the automatic or Home telephones. The judge held that the question was one which should be tried out on its merits.

OLYMPIA, WASH.—Today the public service commission entered an order directing that subscribers of the Olympia farmers' line be allowed telephone connections with the Olympia Telephone Company or Bell system for $5 a year, this being a cut from $7.20, as fixed by the company. Formerly the subscribers of the rural lines in Olympia were connected with Olympia at a rate of $3.60 a year. The Bell company raised the rate to $7.20 and a complaint was filed. The Pacific Telephone Company is expected to fight the order. If no litigation is started it will perhaps cause a readjustment of rural telephone rates in all sections of the State.

LOS ANGELES, CAL.—The American Telegraph Company will have to obtain a franchise and pay 2 per cent of its gross receipts each year for the privilege of doing business in Los Angeles. This is the decision of the board of public utilities, which has served notice on the company that the permit under which the company has been operating in the past and which cost the company nothing, will run out in a few weeks and a new franchise will be required, including all the requirements now enforced on all corporation franchises. The new franchise will compel the company to remove its wires from poles, and to place them in conduits, and also will have a clause enabling the city to compel the company to place its wires in a general city conduit as soon as that innovation is installed.